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MEMOIRS

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On the Flora of Western North Carolina and Contiguous Territory.

BY JOHN K. SMALL AND A. A. HELLER.

ISSUED FEBRUARY 20th, 1892.

PRICE, 50 CENTS.

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FLORA OF WESTERN NORTH CAROLINA AND CONTIGUOUS TERRITORY.

BY JOHN K. SMALL and A. A. HELLER.

The morning of June 2d found us at Lynchburg, Va., whence we proceeded to Roanoke, at which place, according to our plans, we were to spend the first day of our three months' botanical campaign in the South.

Of course anything strange or of much interest could not be expected from this locality, as the date of our visit corresponded too closely with that of Dr. Britton's party the previous year. However, we found about a dozen species not reported before.

Jeffersonia diphylla, then in mature fruit, grew among the bushes on the south bank of the Roanoke river, and some distance below this was *Zizia Bebbii*, together with *Scutellaria nervosa*, and a peculiar, slender form of *Oxalis stricta*. The leaves of this plant are mottled and the peduncles very much recurved. Near by, a small form of *Ranunculus recurvatus* was picked up, also *Heuchera hispida*.

On the rocky banks where the beautiful *Clematis Addisonii* grows we found quite an abundance of *Draba ramosissima*, and some plants of the rare *Arabis lævigata*, var. *Burkii*, which has been reported before only from a few localities in Pennsylvania.

The day became very warm, and later in the afternoon a thunder-storm drove us back to the city. In the evening we returned to Lynchburg. There were many interesting plants along the way, but of these the rapid movement of the train permitted

only fleeting glimpses. Most noticeable was *Senecio aureus*, var. *angustifolius* and a showy *Pentstemon*.

Early the following morning we left for Danville, which is located on the State line of Virginia and North Carolina. Seeing many attractive things from the cars, we decided to leave the train about ten miles above Danville and spend the day in collecting. The weather was wonderfully hot and water scarce in the same degree, only one spring being met with during the day. But some thirty species were collected.

On a wooded bank was *Polygala Senega* in fruit; *Cypripedium pubescens* was still flowering, and *Senecio aureus*, var. *angustifolius*, formed large golden patches everywhere. In a shaded hollow we came across a number of both staminate and pistillate plants of *Chamælirium luteum*, while in the exposed places a robust form of *Pentstemon lævigatus* flourished. On the sandy shore of the Dan River were patches of *Sagina decumbens* and in one place a tangled mass of *Vicia angustifolia*, var. *Bobartii*.

Late in the evening our journey was continued, and Salisbury, N. C., was reached after midnight. Our destination lay about twelve miles from there, but we were compelled to wait until three o'clock the following afternoon for transportation. During the middle of the day, to one not used to it, the heat in that section is almost unendurable, so the time was spent in trying to keep cool.

A hot ride to the village of Gold Hill brought us to the end of the railroad accommodations. From this place a conveyance was to transport our baggage to Heilig's Mill P. O., but it failed to appear. Shouldering our collections and baggage, except the trunks, and going to the village to get our bearings, we were told the interesting news that the proper station had been passed. However, they said it was between two and three miles to Heilig's Mill. The ability of some of the Southern natives to tell what is not true is amazing.

Interesting vegetation lined the way. *Vaccinium arboreum* in flower was scattered all through the pine woods, *Castilleia coccinea* covered the meadows and swamps, and here and there different species of *Cratægus* would appear. *Filago Germanica* and *Marshallia lanceolata*, var. *platyphylla*, were not so common.

In the woods which surrounded our headquarters were several patches of *Clematis ochroleuca;* along the outskirts was *Cratægus spathulata*, and in damp places *Asarum arifolium* pushed up through the fallen leaves. "Pigs" is the very curious local name for this latter plant. In old fields *Barbarea præcox*, robust *Gnaphalium purpureum*, *Pyrrhopappus Caroliniamus*, *Allium mutabile* and *Lolium temulentum* abounded. On banks and in open places through the woods, a slender form of *Pentstemon lævigatus*, with dark lead-colored flowers, grew.

A short excursion on June 8th between showers, produced, among other things, a pubescent form of *Zizia cordata*, and the introduced *Bupleurum rotundifolium.* The mistletoe was seen in a number of places, and in every case grew on species of *Hicoria.*

The continual rain made the roads almost impassable, and the drying of specimens slow work. In fact, a number of the best specimens from Virginia had to be thrown away on account of the dampness. Under these circumstances satisfactory work being impossible, a start for the mountains was determined upon, and by eight o'clock on the morning of June 9th we were on our way to the Blue Ridge. The most serious incident that occurred on the way was that of having a satchel stolen, containing many articles which would have been of the greatest use in the mountains.

Lenoir, a town near the foothills of the Blue Ridge, was reached shortly after midnight. The summit of Blowing Rock mountain was the objective point, and early in the morning, after replacing some of our stolen baggage and making all necessary arrangements, we procured a horse and buggy and started on the remaining part of the journey. For eleven miles the road runs between low hills, and crosses the Yadkin river repeatedly. After passing the eleventh mile-post, it reaches the Blue Ridge proper and begins the ascent of Rip Shin mountain, winding around and over many other ridges, with quite a grade for the distance of nine miles.

The mountain part of the road did not seem to agree very well with the horse, so plenty of time was given him, and after a ride of eight hours we reached the top, an altitude of 4,200 feet. The last two or three miles were the most interesting. At

some places there were splendid views of the surrounding country, the whole a vast sea of mountains. Then, too, there was an occasional bush of *Rhododendron calendulaceum* or *R. Catawbiense*, forerunners of what was to come, for, a few hundred yards east of our headquarters was a little forest of the former, one great mass of color, ranging from yellow to scarlet. About a mile west of this spot, near the village of Blowing Rock, which is situated on a plateau many acres in extent, was a great quantity of *R. Catawbiense*, bushes ten feet or more in height, and between the two we almost lost our heads. Both, however, were past their prime, and a week later only the ghost of their former glory remained.

Our hopes at this time concerning the weather were none of the best, but in a day or two the sun came out, and our work was begun in earnest. One of the first things which claimed our attention was a *Pentstemon*. This had been collected in fruit the previous year and its peculiarities noted, but now its dissimilarity to any of our eastern plants was apparent in its large pink-purple, secund flowers. It is rather plentiful on the eastern slopes, especially in damp places. It was not noticed below 3,000 feet elevation, if indeed as low as that.

Along the road near the Blowing Rock hotel is a clump of *Ligustrum vulgare*. It was also noticed sparingly in the John's River valley, though not recorded in Chapman's Flora.

Asarum Virginicum was different here from any seen by us in Virginia and the middle country of Carolina. The leaves, instead of being mottled with white, were dark green and more orbicular in outline.

Menziesia globularis was so plentiful and the specimens so fine that what seemed to be an everlasting supply was collected.

Viola hastata and *V. rotundifolia* were in their accustomed habitats, and some plants of a depauperate form of *V. blanda* grew at one place. *Stellaria pubera* was quite scarce, as was also *Ranunculus recurvatus*.

On the 16th of June we turned our faces toward Grandfather mountain. This was quite a task for our unseasoned limbs, but the summit was reached shortly after midday. A thunder storm to the west of us was making things lively, and we were not al-

together comfortable at the thought of being overtaken by it. But it kindly passed off on the other side.

On the summit, at an elevation of 6,000 feet, were *Clintonia borcalis*, *Pyrus nigra*, *Ribes prostratum*, etc. *Leiophyllum buxifolium*, var. *prostratum*, grows in rather inaccessible places on the edges of the cliffs, as well as in crevices in the rocks. The branches are gnarled and twisted, and the main stems of some of the plants an inch or more in diameter near the base.*

From halfway up until near the summit, growing in and alongside the trail, was plenty of *Cardamine Clematitis*. To the best of our knowledge this plant has been reported before only from Roan mountain. Near the spring, which is a sort of natural water-cooler, except that there is no ice visible, is a swampy place full of *Saxifraga micranthifolia*, and among it were a few plants of *Hydrophyllum Virginicum* with deep violet flowers.† This form was seen at several other places. Further down on the lower slopes were collected the odorous *Allium tricoccum*, *Viola Canadensis*, *Arisæma polymorphum*, and a very small-flowered, long and slender-peduncled form of *Asarum Canadense*.

Instead of staying over night at the hotel at the foot of the mountain, we retraced our steps until darkness overtook us. The worthy people of whom lodging was demanded had eaten their supper, but after some delay the barefooted and rather unprepossesing hostess announced that we could have something to eat. The next morning our progress toward Blowing Rock was decidedly slow, and had not something worth collecting turned up occasionally, it would have been a very tedious tramp. In damp, shady places *Listera convallarioides* hid itself securely in the grass and leaves, and at Shull's Mill on a rocky bank along

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* The determination of specimens of this plant from different stations has proved somewhat of a problem, owing to the manner of growth. Those from Roan seem to be prostrate, but are not. They are imbedded in the soft turf, and when dug out are found to be erect, often over a foot in height. On Grandfather it grows on exposed rocks and ledges and is more truly prostrate, as is also the case with those on the northern end of Table Rock. But on the southern end it grows erect, covering the rocky ledges in many cases. The characters, as far as have been observed, are the same.

† The same thing has been reported from Western Pennsylvania by Prof. Porter, and from Alaska by Dr. Gray, Syn. Fl. ii. p. I., 155.

the Watauga river, a harvest of *Eatonia Dudleyi* and *Viburnum cassinoides* was reaped, both new to the Southern flora. Here, too, was *Physocarpa opulifolia*, with more slender and pointed leaves than in the North, and also, instead of the bushy *Lonicera glauca*, a weak, slender form creeping over the bushes.

In a field about five miles west of Blowing Rock, and at other places along the road, was an abundance of *Thalictrum purpurascens*, another plant not credited to the country south of Virginia. This field also yielded a good sized bed of *Fragaria Virginiana*, evidently uncultivated, but the fruit large and attractive looking. Many dozens of them were collected, but the receptacles into which they found their way were not portfolios. Not far from this spot a *Thalictrum* was gathered, which, although past flowering at a higher elevation, was still in condition for studying here. It proves to be a new one and has been named by Dr. Britton, *T. dioicum* var. *coriaceum*.*

After recovering from the fatigue of the first raid, June 22d was set apart for an excursion down the eastern slope of Blowing Rock mountain. It was very interesting to note the difference caused by the elevation in the time of the flowering of species. One after another would appear and then disappear, as if restricted to certain belts. *Chamælirium luteum* thrived at 2,500 feet, and at the same elevation *Pogonia divaricata* grew in the shade by the wayside. Some distance above this was a belt of low bushes of *Castanea pumila*, with remarkably large flowers and white, tomentose leaves. *Symplocos tinctoria*, *Tephrosia Virginiana*, and a strict form of *Andromeda ligustrina*, var. *pubescens*, were everywhere. Still higher on a springy bank along the road *Phacelia bipinnatifida* showed its pretty blue flowers, and gave forth its disagreeable odor.

We soon came into a belt of our new *Pentstemon*, and found it flowering profusely. In places *Œnothera fruticosa*, var. *Pilosella*, with its large yellow flowers lined the road, and on the rocks was an occasional bunch of *Tradescantia pilosa*.

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* Bull. Torr. Club, vol. xviii. 363. This well marked, new variety of *T. dioicum* was collected at a number of places on the plateau and slopes of Blowing Rock mountain and Stone mountain, and was seen on Table Rock and Roan mountains. It is most closely related to the above-named species, but flowers at least six weeks later, and has an average height of five feet.

On the return trip from Grandfather a wild-looking ravine excited our curiosity, so on June 24th we started out to investigate the locality, which is about five miles west of Blowing Rock. Before going very far a most beautiful sight was presented to us. By the side of the road is a large rock. From its top rises a fine spring, which trickles down the sides. This rock, situated in the shade, is covered with mosses of every shade of green, and the delicate white flowers of *Thalictrum clavatum*, growing among the mosses, made a most pleasing contrast with its green surroundings. The ravine, in appearance, is like a large sloping gutter filled with loose stones and rocks, which, however, are well covered with vegetation. Along the lower edge *Viola Canadensis* and *Asclepias exaltata* pushed their way up between the rocks. Above these, among bushes of *Ribes Cynosbati* and *R. rotundifolium*, were robust plants of *Hydrophyllum Canadense*, bearing its flowers on rather slender peduncles. But, better than all these, in one way, was *Osmorhiza longistylis*, another species new to the flora of the Southern States.

Several friends from the North, who had a desire to come to the mountains and rough it a while, were expected to arrive in Hickory on June 26th. Concluding that a trip to that section of country would yield profitable results, a start on foot for Lenoir was made at seven o'clock on the morning of the 25th. The weather on top of the mountain was delightful, and we anticipated a pleasant walk, only to be disappointed. After leaving the mountains the heat along the treeless, sandy road seemed as if it would surely roast us. This broiling operation, however, was not for naught. The tramp produced another plant new to the South,—*Papaver somniferum*, introduced at one place. Upon the bank of the Yadkin river where it flows out from the foot of Rip Shin mountain, was *Heuchera pubescens* in all stages of development, from bud to fruit, and here also we made our first acquaintance with the two species of shrub most common in that section—*Calycanthus glaucus* and *C. lævigatus*. Lenoir was reached in time to catch the train and at three o'clock it pulled into Hickory. When we had tested the soda-fountains, we sauntered off in the direction of a swamp, which by chance, had been discovered while passing through the town several weeks before.

Just west of the town was an abundance of *Lonicera Japonica*, a plant which has been very much slighted, inasmuch as every manual fails to notice its existence. There is no doubt that it has become naturalized, especially in the South, where it was seen in many localities.

An old gentleman came along and advised us by all means to go to the new cemetery. Perhaps he thought we wanted to depart this life at the end of such a hot day. His advice was followed and it was voted a pretty good place, for in it grew a tall form of *Houstonia purpurea*, which must be placed under the variety *longifolia*, and an exceedingly queer *Cratægus*, which has been referred to *C. parvifolia*.

After a peaceful night's slumber at the New Charter House, the swamp was investigated. This little place at the foot of the Blue Ridge seems to be a handshaking spot for the plants of the North, East, South and West. The first thing that turned up was *Gaylussacia dumosa*. This was somewhat of a surprise and was soon followed by another in the shape of *Scirpus sylvaticus*.*

Amianthium angustifolium was the next surprise, a remarkable extension of its range to the west. *Xanthorrhiza apiifolia* formed large clumps on the border of the swamp, and in dryer situations *Phlox amœna* grew sparingly, together with a few plants of *Pentstemon lævigatus*, var. *canescens*. *Rhododendron viscosum* and *Helenium nudiflorum* were both well represented, but rather old. *Eriocaulon decangulare*, *Calopogon tuberosus* and *Sarracenia flava* were there also, but interesting above all was a most strange *Thalictrum*.*

The well-marked characters of this plant certainly give it specific rank. It can hardly be placed under *T. polygamum*, (*T. Cornuti*), on account of its dicœcious flowers. Specimens from West-

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*The Southern limit of this species heretofore was White Sulpher Springs, W. Va., where it was collected by Dr. Britton. It has also been collected at a number of localities in Northern and Southern Pennsylvania, although the "Revised Manual" gives its range from Eastern Massachusetts to New York.

†THALICTRUM MACROSTYLUM (Shuttlw.); (*T. Cornuti*, var. *macrostylum*, Shuttlw. in dist. pl. Rugel. 1845-6.) Stem striate, ½-1½ meters high, much branched above; cauline leaves nearly sessile; leaflets small, entire or slightly 2-3-lobed, pale green above, whitish beneath; flowers dicœcious, staminate white, pistillate greenish; achenes numerous (12-24), somewhat grooved; style large.

ern Florida, collected by Chapman are to be placed here. In the Herbarium of the Academy of Natural Sciences at Philadelphia, is a sheet with a staminate plant of this same species, found at Macon, Georgia, by J. M. Green, labeled "*T. Cornuti* var. *brevifolium*, Rugel in Herb. Gray," with a note added by Dr. Gray "probably only *T. purpurascens*," but the characters of the plant debar it from that species.

At one time we thought our last hour had come, and that our bones would be laid to rest in the cemetery back of us. We suddenly came upon an old woman with a temper like the far-famed Xantippe. In her hands she held a very formidable-looking scythe, with which she was hacking away at the grass. She berated us soundly for tramping down her hay, and as long as we were in sight, the least movement towards the precious grass brought forth a fresh tirade.

Some thirty-five miles to the south lay Table Rock mountain and the Hawk's Bill. The sight of these two peaks admonished us continually that we must hasten to them and the surrounding country to see what things of interest might be there, and just after daybreak on the morning of July 1st, a start for Table Rock was made. The first part of the road leads down the southern slope of Blowing Rock mountain for a distance of five miles, thence through the Johns River valley, the latter a very favorite haunt for moonshiners, and on to Globe P. O. Here one has the choice of two routes, one the Johns River road, and the other a trail leading over the mountains to Piedmont Springs. After considering the matter, the route by the trail was chosen, for, although the rougher and more hilly way, there was much more shade, which amounts to a great deal in most valleys of the South.

A fairly good trail led for some miles over several ridges. Then we emerged into the valley of Wilson's creek, and all our faculties, not needed for locomotion, were concentrated on keeping the trail. The almost invincible Aunt Sallie's ridge—the last hard climb of the day—was equal to all the rest of the hills, with their bad qualities put together. From the southern end of Aunt Sallie's ridge, Table Rock was seen about seven miles in front of us. This was the first view we had of the moun-

tain since our departure from Blowing Rock early in the morning. Here was the objective point within seven miles, but required a walk of over fourteen miles to get near the base of the mountain. Traveling became better in some places and at seven o'clock we stood on the porch of Mr. Sisk's house, six miles from the summit. Spending the night here, as all visitors to this peak are in the habit of doing, we made an early start for the ascent.

The eastern slope is remarkably dry and the vegetation was quite uniform up to the base of the peculiar rock-crowned summit. Here and there, in the dry sand, a plant of *Pogonia divaricata* or *Sericocarpus linifolius* would show itself. Pretty high up was a large patch of the widely scattered *Pimpinella integerrima* and some dwarf specimens of *Luzula campestris*.

The climbing of the immense rock is naturally the most interesting part of the ascent. *Rhododendron punctatum* thrives on the exposed cliffs, and higher up *Leiophyllum buxifolium* formed a green carpet. A cleft in a large rock contained a weak, slender form of *Arenaria glabra*. Very near the summit, *Scirpus caespitosus* almost covers the rocky surface, and mixed with it is a depauperate but pretty form of *Panicum dichotomum*. The flora of the top of the rock proper seems to be separated into two parts, the one embracing the northern half and the other the southern half. The most conspicuous species on the northern end are *Vaccinium pallidum*, *Robinia hispida* and *Pogonia divaricata*. The vegetation on the southern end is more varied. Here occurs the ever-present *Galax aphylla*, *Leiophyllum buxifolium*, a peculiar, spreading form of *Hypericum prolificum*, *Nemophyllum setifolium*, and the rare *Hudsonia montana*. *Calopogon tuberosus* is common to both ends, while the exposed rocks were decked with a slender, wiry growth of *Selaginella rupestris*.

Early in the afternoon, swarms of a small species of bee covered the summit of the mountain, and it is not necessary to say that they became quite troublesome; some insisted in getting into our hats, a number accompanied us more than half-way down the mountain, and on unpacking one of the bundles of Table Rock plants over two months later, one of the little insects walked out.

Liquidambar styraciflua filled the woods at the base of the mountain, along with an occasional tree of *Ilex opaca*.

Steady walking brought us to Piedmont Springs after night came on, and we were received there with more hospitality than at any other place in the mountains.

Next morning the first difficulty to present itself was Aunt Sallie's ridge, but after some effort the top was reached. By a large patch of *Vaccinium vacillans*, a halt was made for the purpose of eating and resting. The rocks produced *Asplenium platyneuron* with incised pinnæ, and in a wild gorge at the northern end of the ridge is an abundant stock of the rare *Carex Fraseri*.

A short distance from this place we again struck the famous Wilson's creek, and made our way along the south bank for some miles. The bright green *Xanthorrhiza apiifolia* covered the ledges of the cliffs. *Boykinia aconitifolia* was discovered on the sandy bank of the creek, and once in a while a plant of *Liparis liliifolia* or *Pogonia verticillata*. While making our way over the rocks, our inspiration was suddenly revived by the delightful odor of *Rhododendron arborescens*, and a few steps brought us before the beautiful tree-like shrub in full bloom. It may be interesting to note here that *Danthonia compressa* was quite common in this valley, although generally it prefers the summits of the higher mountains.

On a tributary of Wilson's creek, one bush of *Pyrularia pubera* sprang from a ledge on the cliff, while along the edge of the water *Calycanthus glaucus* and *C. lævigatus* were perfectly at home. A little further up the stream the ominous sound of a rattlesnake greeted us, but the reptile was left to himself, as the spot was by no means suitable for an encounter. However, the incident led to the rediscovery of an *Asarum* not collected for many years.*

Our supply of rations for the day was somewhat limited at

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* *Asarum Virginicum*, L, var. *grandiflorum*, Mx. in DC. Prodr. xv. 426 (1864). *Homotropa macranthum*, Shuttlw. Mss.

This plant, collected by Rugel in 1841 on the Broad river, N. C., seems to have been unnoticed ever since by collectors, and is not given a place in Chapman's Flora. It is undoubtedly a variety, and perhaps, as Shuttleworth thought, a species. It is easily distinguished from *A. Virginicum* by its long peduncle, which averages 2½ cm. in length, and by its calyx-tube, from three to five times larger, mottled with violet, and large, unequal spreading lobes; also, the anthers are equally four-ribbed.

the start, and it was lessened considerably when one of us discovered that his share had disappeared. Of course he began to get very hungry as soon as the loss was noticed, and there was great lamentation when he pictured how some wandering dog, or, perchance, a bear, would feast on his chicken and biscuits. Finding at length that the outer man was unable to make much headway, it was decided to fill up the inner one at the first suitable place. Pie was demanded, but there was nothing of that description to be had. Cold potatoes and cold corn-bread, the heaviness of which was enough to cause a man with a cast-iron digestive apparatus to turn pale, were set before us. We ate, and, to our astonishment, are still alive.

While passing through the John's river valley, a heavy thunder-storm came over the mountains and, in the excitement, collecting suffered. Only one plant was picked up, but it was an important discovery—*Verbena riparia.**

This brings to light another species which Rafinesque collected and named many years ago. The type is preserved in the Columbia College Herbarium, and it seems strange, but it is evident that neither Dr. Gray nor Dr. Engelmann ever saw it, for no reference is made to it in their respective works on the genus. We found it in the mountains on the banks of the John's river and in the low country at the falls of the Yadkin, in both cases true to the name which Rafinesque gave to it.

The only adventure worth recording was the meeting of a brace of wildcats just after nightfall as we were climbing the slopes of Blowing Rock mountain. Upon close inspection they turned out to be a branch with two bunches of leaves on it.

One evening a zealous native appeared who was very anxious to guide us to some of the neighboring places. He got little encouragement, but his pertinacity was prodigious. After he had persecuted us several times we concluded that he might act as guide on a trip to Stone mountain, and do service by carrying the baggage. This mountain is about twelve miles southeast of

* *Verbena riparia*, Raf. (1830) *V. hastata*, L., var. *oblongifolia*, Nutt. Genera, ii. 40 (1818)? Stem rather tall (average one meter), slightly four-angled, virgately branched above, spikes very slender; leaves pinnatifid, lanceolate to ovate-lanceolate, pubescent, veins very prominent beneath; flowers slightly smaller than in *V. hastata*, light blue; fruit scattered along slender branches.

Blowing Rock, and a stranger would have considerable trouble in finding his way to the summit. The guide lost the trail when the foot of the mountain was reached, in order, perhaps, that he might act as guide at a future time.

On the western side of the mountain, extending almost to the top, is an immense tract of rocks, upon which are very few trees, the vegetation being herbaceous or shrubby. There were detected a few bushes of *Rhododendron punctatum* and an abundance of a tall, woody *Hypericum*, upon which was neither flowers nor fruit. An unusually long-leaved form of *Aletris farinosa* appeared among the trees along the upper edges of the rocks, which were clothed with cushions of *Paronychia argyrocoma*, and adorned with an occasional clump of *Talinum teretifolium*. *Chionanthus Virginica* was there in force, as was *Thalictrum dioicum*, var. *coriaceum*, and a very vigorous form of *Arenaria glabra*, some of the plants being fourteen inches high and very spreading, the tufts often having a diameter of a foot at the top.

A second excursion to Grandfather proved an interesting one. The first noteworthy plant collected was *Carex Fraseri*. A few hundred feet from the base, the trail leads through a grove of *Prunus Pennsylvanica*, and higher up in damp, mossy places *Oxalis Acetosella* forms vast patches. At this time of the year the higher parts of this grand old mountain are the most productive. Near the ice-cold spring, whose elevation is about 5,000 feet, is a vigorous growth of *Glyceria elongata*, a rare grass in the South. On the ledges of cliffs occur *Carex canescens*, var. *alpicola*, and a coarse form of *Saxifraga leucanthemifolia*. Along the trail above the spring *Vaccinium erythrocarpon* begins to appear, as well as *Pyrus Americana*. From the elevation of 5,000 feet to the summit a peculiarly smooth *Rubus villosus* * has its home.

Carex debilis puts in an appearance at the first summit. Fine specimens of *Abies Fraseri* and *Picea Mariana* were obtained here. The history of the terrific storms that pass over Grandfather's head during the winter is written in the last named

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* This plant growing in dense clusters from the elevation of 5,000 feet to the summit, is destitute of prickles except an occasional poorly developed one on the young shoots. It was also collected on Roan mountain at the same elevation.

trees, for all the branches that face the northwest are either worn off or dead. The top of the mountain was free from clouds during the early part of the afternoon, and a magnificent view of the vast surrounding sea of mountains and peaks was presented to us. Many miles to the west lay the Great Smoky range; most prominent in it was the Roan, and plans were at once made to visit that mountain the following week.

During the intervals between trips to distant points many minor excursions were made nearer headquarters. Some rare and many common species were gathered for the sake of locality. Traveling over a trail through the woods a number of times a hemlock with unusually large leaves and cones was noticed; afterwards the same thing was seen in other places. Branches were secured and the tree proved to be *Tsuga Caroliniana*. It is scattered over the plateau and grows in company with *T. Canadensis*, but was not observed below 4,000 feet elevation. *T. Caroliniana* is a beautiful tree and in some respects more handsome than its northern sister.

On the 13th of July our headquarters were filled almost to overflowing by the arrival of a party of friends from Salisbury, among whom were six young ladies. To say that we had an enjoyable time—as far as it was in the power of two hard-working collectors—is a very temperate expression.

Roan mountain, which was reached on the evening of the 15th, yielded little that has not heretofore been recorded. But it was a paying trip nevertheless, for on the rocks not far from Lyon's bluff we came upon *Arenaria Grœnlandica*, a remarkably southern extension of this alpine plant of the North, and of course an addition to the Southern flora. Near it were several plants of *Ranunculus septentrionalis*, with the flowers much reduced in size. *Potentilla tridentata* as far as we noticed grew on the open ground and not on rocks. Upon the precipitous cliffs of Lyon's Bluff, *Sedum roseum* and *Scirpus cæspitosus* were plentiful.

Only two plants of *Lilium Grayi* were noticed, but they were within an enclosure, upon which was a notice warning persons not to disturb the things within. Information came too late that it was blooming in a meadow beyond Linville and also between Blowing Rock and Boone. Handsome, but dwarfed plants of

Habenaria fimbriata grew on the upper slopes and the grassy summit.

The color yellow was well represented in the flowers of *Senecio aureus*, var. *Balsamitæ*, the rare *Geum radiatum* and *Hypericum graveolens*. Some distance down the western slope grew *Carex Pennsylvanica* and a very slender form of *C. æstivalis*. Many fine and beautiful trees of *Acer saccharum* stand near the base of the mountain, with an occasional *Tilia heterophylla*, while *Aster ericoides*, var. *villosus*, is rare.

The night of the 16th was spent at Roan Mountain Station, where we arrived after the supper hour and had to be content with an improvised meal. A short investigation of the banks of the Doe river, the next morning, added to our list *Verbena officinalis*, and some small and not very well developed *Veronica Anagallis*, which is new to the Southern States.

Then the train on the go-as-you-please narrow gauge railroad was taken for Cranberry. This road is a marvel of slowness, as its passenger train sometimes travels the distance of nine miles in seventy minutes.

The tramp of twelve miles from Cranberry to Linville was rather tiresome on account of the baggage, but the surroundings were inspiring. The greater part of the road lies over a mountain plateau, which is one of the extensions of the Smoky range. In a wet place, somewhat more than a mile from Cranberry, we discovered plenty of *Veronica Anagallis*, some of the plants being almost three feet tall. Several miles east of this place a dry bank yielded very fine *Phlox glaberrima* and *Anychia Canadensis*.

Pyrola rotundifolia adorned the mossy places in the woods, also an occasional fruiting *Cypripedium pubescens*. *Pyrola elliptica* was sought for, but in vain. This species has not yet been reported from the South.

About half way between Cranberry and Linville is a swamp, which ought to have more attention paid to it. Our attention was mainly directed to getting a good supply of *Hypericum densiflorum* which, in some places grows in dense masses. Near the north fork of the Doe river, we obtained the pubescent form of *Zizia cordata*, like that secured before in the middle country of the State.

Black clouds now gathered around the mountain tops and spread over the whole plateau, and in a short time a light rain began to fall. All possible haste was made for Linville and the shelter of the inn reached about dark, just in time to escape a deluge from above.

A steady, pouring rain continued through the night and following day, so collecting was out of the question.

After breakfast, with the plunder of the raid, amounting to eleven hundred and fifty specimens, we took the stage for our headquarters beyond Blowing Rock. Of course it was necessary to keep inside the stage-coach, but traveling in this way soon became monotonous. Having lost considerable sleep on the trip, we were naturally inclined to drowsiness, but woe to the person who attempts sleeping in a regulation-coach on a new mountain-road during a heavy rain.

This was the beginning of the rainy season, which sets in about this time each year. It interfered much with our plans, but we managed to circumvent the showers and make a number of successful excursions. However, our scheme for a jaunt to the southwestern corner of Virginia, White Top mountain and vicinity, was completely spoiled. These places would, no doubt, have yielded good results, and we hope to explore them sometime in the near future.

July 25th was devoted to exploring portions of the new road between Blowing Rock and Linville. This road, which for three-fourths of its length winds along over the foot hills and slopes of Grandfather mountain, finally crossing it near Linville, presents some very beautiful scenery.

The objective point was about fourteen miles from Blowing Rock, where the road passes through two or three promising spots. On tracts, many acres in extent, not a tree is to be seen. Immense loose rocks lie scattered about, and on the largest tract is a ledge extending to the summit of the mountain, almost 2,000 feet above.

The principal growth is *Vaccinum pallidum*, but on the more level portions there was an abundance of *Zygadenus leimanthoides*, a low and generally solitary-flowered form of *Lilium superbum*, *Xerophyllum setifolium*, now past flowering, but attain-

ing a height of five feet, an occasional glimpse of the beautiful pink *Calopogon tuberosus*, and sometimes, too, of the no less charming blossoms of *Robinia hispida*, although these latter were few and far between.

The handsomest specimens of *Asplenium montanum* that we had ever seen were found there in a crevice of a large rock. A swift-winged bird of some kind darted out of the opening with a loud whirr, and the undignified way in which two individuals left that rock would have amused a spectator exceedingly.

On the return trip, a halt was made at one of the few clearings through which the road passes. Here *Lilium superbum* was scattered among the grass in great bunches of color, some of the stalks having upon them six or eight open flowers. The introduced *Spergula arvensis* was found by the wayside, and on a hill occurred *Hypericum graveolens.**

On the borders of a thicket *Clematis Viorna* adorned the bushes, but the most important find of the day was a new variety of *Smilax rotundifolia.*†

During the rainy season, one afternoon an attempt was made to go to the woods to collect mosses. But before going very far, a heavy thunder-storm came up over the eastern side of the mountain and drove us back to headquarters. Only one plant was picked up on a small hill near the head-spring of the New River, and a rare find it was: *Senecio Millefolium*, var. *Memmingeri.*‡

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*Hitherto, in the descriptions of this species, the stem has been described as "nearly simple." This may hold in plants from high elevations, as on Roan 6,300 feet; but specimens both from Blowing Rock and Grandfather mountains, elevation about 4,000 feet, are branched more than half way down the stem. The branches are densely flowered and the flowers only about half the size of those from higher elevations.

†*Smilax rotundifolia*, L. var. CRENULTA, n. var. Stem armed with but few prickles. Leaves *lanceolate* to *ovate-lanceolate*, *erosely-crenulate*, never *cordate* at base, the smaller ones inclined to taper, prominently three-nerved, 3-7 cm. long, 1-4 cm. wide; pedicels 2-3 mm. long, only half the length of the peduncles; berries smaller and fewer in number than in the species.

Collected in deep woods, on the southern slope of Grandfather mountain, elevation about 4,000 feet. To this variety are to be referred specimens collected on Stone mountain and in the Richland valley, although the leaves are slightly broader and less glossy.

‡*Senecio Millefolium*, T. and G., var. *Memmingeri*, Britt. The type of this variety was collected in 1887, by Mr. E. R. Memminger, in Henderson County.

It was discovered one day that Rocky Knob, a spur some five hundred feet below the plateau of Blowing Rock, is a place not to be despised. Here *Pinus pungens* puts in an appearance, and among it grows an unusual form of *P. rigida.* The tree is medium-sized, like many others of the same species, but the cone instead of having the usual flat base, is rounded, short and slender, of a beautiful brown tint, and looks as if it were varnished.

In the sandy woods *Sericocarpus asteroides* and *Gerardia lævigata* were mingled with lusty looking bushes of *Vaccinium vacillans*, and on the rocks a few clumps of *Talinum teretifolium*, a solitary bush of *Hypericum prolificum*, and a small-leaved form of *Gaylussacia resinosa.*

Another visit to Stone mountain on July 31st yielded about the same results as the former trip. But in the Richland valley, near the foot of the mountain, several good things were picked up.

Near the ruins of an old house were great clumps of *Symphoricarpos vulgaris*, full of flowers and correspondingly full of bees. On the damp, moss-grown banks of the Little Branch, *Carex Fraseri* was secured again, this being the third station noticed. In shady situations *Leucothoë Catesbæi*, and on more elevated sandy ground, one or two bushes of *Ilex montana*, var. *mollis* occurred.

On the eastern slope of Blowing Rock mountain beautiful specimens of *Polygala Curtissii* began to appear at an elevation of 3,000 feet. Here also was *Pycnanthemum Tullia*, and a little further down on dry, sandy ground *Nyssa aquatica*, and plenty of an *Alnus* which unfortunately was not collected.

On August 6th, in company with Prof. W. P. Wilson, of the University of Pennsylvania, was made the last trip to Grandfather mountain. The only noteworthy plant not collected before was *Rhododendron Vaseyi* in fruit, growing on the summit of the mountain, and *Solidago glomerata*, which was just coming into bloom. Beginning at an elevation of about 5000 feet, where *Aconitum reclinatum* has its home, and extending almost to the very summit, was a wealth of the beautiful pink-purple *Chelone Lyoni*, and at intervals a clump of *Monarda didyma.* Near the summit *Polypodium vulgare* was found sparingly growing on trees.

Our last collecting in the mountains was done on the 8th of August, when the ledges of "Blowing Rock" itself were investigated. Vegetation here seemed to be very backward. *Sedum telephioides* was hard to find in flower, nearly all of it being still in bud, and *Paronychia argyrocoma* was not much better. The plants of *Polypodium incanum* found were small, but with well developed *sori*. The purple-flowered form of *Allium cernuum* hung its nodding heads over the ledges. This plant has a strange look, not only on account of its purple color, but the perianth in the living plant is contracted at both top and bottom.

The chief object, however, was not found. *Liatris Helleri*, collected here on August 18, 1890, was not yet in bloom, but a quantity of *L. graminifolia* was obtained. The latter plant is quite plentiful on the ledges, and presents a beautiful sight when in flower. Many of the ledges are only a few inches wide, and are not by any means safe places on which to ramble about, as the base of the cliff is more than one hundred feet below. One of us has cause to remember the place, for on that day his earthly career was almost ended. While carefully picking his way along one of the narrow ledges, seeking for "onions," his foot slipped, and over he went, turning somersaults, and desperately clutching at anything that offered support. A narrow shelf and a friendly bush finally stopped his descent, after he had fallen about fifteen feet. Two badly damaged fingers and several minor bruises were, fortunately, the only results.

A grand exodus was planned for the 11th. The few previous days were devoted to securing lumber, making boxes and packing the accumulations of over two months' labor. Early in the morning two baggage wagons were loaded with trunks and boxes and started for Lenoir. Later, three large hacks appeared, which were to take our party down the mountain. The ride proved a delightful one and Lenoir was reached in time to partake of the dinner which had been telegraphed for. Seven o'clock saw us in Salisbury.

The next day we were entertained at the very pleasant home of Mr. D. A. Atwell, together with other friends, who had been with us in the mountains. Our party now separated, and in the evening we were stationed in our new headquarters, the hospita-

ble home of the Rev. C. B. Heller, near Heilig's Mill, for a week or ten days' exploration in the middle country of North Carolina.

A great part of this region is covered with a growth of *Pinus echinata*. These woods do not contain much of special interest, for some years ago they were cultivated fields; but eight miles to the east are the pine-barrens, which are natural gardens.

Tecoma radicans decorated the trees and shrubs with its large red flowers and spindle-shaped fruit. *Lespedeza striata* clothed the waysides, and *Desmodium canescens* and the tall wand-like *Paspalum Floridanum* were everywhere. On the borders of the meadow stood trees of *Nyssa biflora*. Within were many rare and beautiful plants. The bright golden *Silphium Asteriscus* appeared first, then a large and showy lot of *Liatris spicata*. *Vaccinium virgatum*, var. *tenellum*, grew in the tall grass and not far away was a bed of the very rare *Aster ptarmicoides*, var. *Georgianus*, which, according to the Synoptical Flora, has been found heretofore only in Northern Georgia and Northwestern Arkansas.

The stems of *Physostegia Virginiana*, var. *speciosa*, attained a length of five feet. In dryer places *Hypericum virgatum* grew in company with the bright *Centrosema Virginiana*. Large trees of *Fraxinus pubescens* and *F. viridis* were noticed at different points and at one locality a limited supply of *Commelina hirtella*.

A small swamp in the woods was overgrown with the graceful *Juncus setaceus* and *Cyperus flavescens*, with an occasional clump of *Kyllingia pumila*.

It was unanimously decided to celebrate the last raid of the season by an excursion to the Falls of the Yadkin, and the start was made before daybreak on the morning of August 18th. The falls are situated between twenty-five and thirty miles southeast of Heilig's Mill, and not, by any means, easy to find for one not used to North Carolina roads.

At daybreak, about a mile west of Gold Hill, a new station for *Lotus Helleri* was discovered, while several miles east of the same village *Solidago serotina*, var. *gigantea*, abounded, and was remarkable for its slender and graceful habit. Now the road entered the pine-barrens, and in a small swamp, growing in a tangled mass, were *Lobelia Nuttallii*, *L. puberula*, *Habenaria ciliaris*, *Rhexia Mariana*, and a peculiar, wand-like *Solidago*. This latter plant is

new and has been named by Prof. Porter, *S. Boottii*, var. *Yadkinensis*, after the river near which we found it.

Late in the afternoon, the falls were reached. The river at this point breaks through some low hills. The banks are very rocky and in some places rise to quite formidable cliffs. It is an extraordinary locality and a number of days could be profitably spent in exploring it. Only one hour was at our command and this was not without good results.

The most remarkable find was that of *Acer saccharum*, var. *Floridanum*. This extends its range about five hundred miles to the north. A beautiful, slender form of *Fraxinus Americana* had its home on the shore of the river, and might merit varietal rank. In company with it was *Rhododendron calendulaceum*. *Gelsemium sempervirens*, and *Bignonia caprcolata* twined over the shrubs. On the rocks *Tipularia unifolia* was in bloom. The cliffs produced *Asplenium parvulum* and *Polypodium incanum*. Here *Polypodium* covers the trunks of trees as well as the rocks. Upon the hot sandy shore *Quercus aquatica* and *Ulmus alata* were prevalent. On top of the bluff *Lotus Helleri*, various forms of *Cratægus parvifolia* and *C. flava*, *Vitis rotundifolia* and *Solidago rugosa* were collected. A meadow furnished finely developed specimens of our new *Solidago* and rank plants of *Polygala Curtissii*.

It cannot be recorded here, how many times we lost the way, how the horse gave out and walking had to be resorted to, the accident that happened to the rations, and other mishaps. But, well pleased with the returns of the jaunt, we reached Heilig's Mill long after midnight.

A season of rain came on now, and a start for home was made when our specimens were sufficiently dried. One more species was collected while passing through Salisbury—*Euphorbia marginata*. It is introduced into waste places and was our last addition to the flora of the Southern States.

LIST OF PLANTS COLLECTED.*

Clematis Addisonii, Britton. Roanoke, Va.

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*All the plants here enumerated were collected in North Carolina, unless otherwise stated. Those marked † are new to the Southern States, as limited by Chapman's Flora.

Clematis ochroleuca, Ait. Heilig's Mill.
Clematis Viorna, L. Blowing Rock, Grandfather mountain, Lenoir, Falls of the Yadkin.
Thalictrum clavatum, DC. Blowing Rock, Grandfather mountain, Roan mountain, Stone mountain.
Thalictrum macrostylum (Shuttlw.), Small. & Heller. Hickory.
Thalictrum dioicum, L. Blowing Rock.
Thalictrum dioicum, L., var. *coriaceum*, Britt. Blowing Rock, Stone mountain, Table Rock.
† *Thalictrum purpurascens*, L. Blowing Rock.
Anemone Virginiana, L. Blowing Rock.
Trautvetteria Carolinensis (Walt.), Vail. Blowing Rock, Roan mountain.
Ranunculus recurvatus, Poir. Roanoke, Va., Blowing Rock.
Ranunculus septentrionalis, Poir. Roan mountain.
Aconitum reclinatum, A. Gray. Grandfather mountain.
Actæa alba (L.), Mill. Grandfather mountain.
Xanthorrhiza apiifolia, L'Her. Hickory.
Calycanthus glaucus, Willd. Lenoir, Wilson's creek.
Calycanthus lævigatus, Willd. Lenoir, Wilson's creek.
Menispermum Canadense, L. Roanoke, Va.
Caulophyllum thalictroides (L.), Mx. Grandfather mountain.
Diphylleia cymosa, Mx. Blowing Rock, Roan mountain, Tenn.
Jeffersonia diphylla, (L.) Pers. Roanoke, Va.
Sarracenia flava, L. Hickory.
† *Papaver somniferum*, L. Lenoir.
Corydalis sempervirens (L.), Pers. Blowing Rock.
Barbarea præcox (Smith), R. Br. Heilig's Mill.
Arabis Canadensis, L. Blowing Rock.
Arabis lævigata, Poir. Blowing Rock.
Arabis lævigata, Poir., var. *Burkii*, Porter. Roanoke, Va.
Cardamine Clematitis, Shuttlw. Grandfather mountain.
Draba ramosissima, Desv. Roanoke, Va.
Brassica campestris, L. Blowing Rock.
Lepidium Virginicum, L. Blowing Rock.
Cleome spinosa, L. Near Bilesville.
Hudsonia montana, Nutt. Table Rock.
Lechea racemulosa, Michx. Rocky Knob, Stone mountain.

Viola blanda, Willd. Blowing Rock, Grandfather mountain.
Viola Canadensis, L. Blowing Rock, Grandfather mountain.
Viola hastata, Michx. Blowing Rock, Watauga river.
Viola obliqua, Hill. Blowing Rock.
Viola palmata, L. Blowing Rock, Hickory.
Viola primulæfolia, L. Hickory.
Viola rotundifolia, Michx. Blowing Rock.
Viola sagittata, Ait. Blowing Rock.
Viola striata, Ait. Watauga river near Grandfather.
Polygala Curtissii, Gray. Gold Hill, east slopes of Blowing Rock.
Polygala incarnata, L. Hickory, Faith P. O.
Polygala Senega, L. Fall creek, Va.
Polygala verticillata, L. Heilig's Mill.
Silene antirrhina, L. Green Hill (Blowing Rock).
Silene stellata (L.), Ait. f. Blowing Rock.
Silene Virginica, L. Blowing Rock.
Stellaria pubera, Michx. Blowing Rock.
Arenaria glabra, Michx. Stone mountain, Table Rock.
† *Arenaria Groenlandica* (Retz.), Spreng. Roan mountain.
† *Sagina decumbens* (Ell.), T. & G. Heilig's Mill, Roanoke, Va.
Spergula arvensis, L. Grandfather mountain (Southern slopes).
Talinum teretifolium, Pursh. Rocky Knob. Stone mountain.
Ascyrum hypericoides, L. Falls of Yadkin, Heilig's Mill, Faith P. O.
Ascyrum stans, Michx. Faith P. O.
Hypericum densiflorum, Pursh. Near Cranberry.
Hypericum gentianoides (L.), B.S.P. Heilig's Mill.
Hypericum graveolens, Buckley. Blowing Rock, Roan mountain, Grandfather mountain.
Hypericum maculatum, Walt. Heilig's Mill.
Hypericum perforatum, L. Blowing Rock.
Hypericum prolificum, L. Rocky Knob.
Hypericum virgatum, Lam. Faith P. O.
Hibiscus Moscheutos, L. Falls of the Yadkin.
Tilia heterophylla, Vent. Roan Station, Tenn.
Oxalis Acetosella, L. Grandfather mountain, Roan mountain.
Oxalis recurva, Ell. Roanoke, Va.

Oxalis stricta, L. Roanoke, Va., Heilig's Mill, Blowing Rock, Lenoir.
Ilex montana, T. & G. Blowing Rock.
Ilex montana, T. & G., var. *mollis* (Gray), Britt. Richland
Evonymus Americanus, L. Roanoke, Fall creek, Va., Lenoir.
Evonymus atropurpureus, Jacq. Roanoke, Va.
Vitis æstivalis, Michx. Heilig's Mill, Shull's Mill.
Vitis cordifolia, Lam. Roanoke, Va.
Vitis rotundifolia, Michx. Falls of Yadkin.
Acer Pennsylvanicum, L. Grandfather mountain.
Acer saccharum, Marsh. Roan mountain, Tenn.
Acer saccharum, Marsh., var. FLORIDANUM (Chap.) = *A. saccharinum*, var. *Floridanum*, Chapm. Falls of Yadkin.
Acer spicatum, Lam. Roan mountain, Tenn., Grandfather mountain.
Rhus aromatica, Ait. Falls of Yadkin.
Rhus copallina, L. Stone mountain, Faith P. O.
Thermopsis fraxinifolia, Curtis. Aunt Sallie's ridge.
Crotalaria sagittalis, L. Heilig's Mill.
Lotus Helleri, Britt. Heilig's Mill, Gold Hill, Falls of Yadkin.
Psoralea melilotoides, Mx. Hickory.
Amorpha fruticosa, L. Falls of Yadkin.
Tephrosia spicata, T. & G. Hickory.
Tephrosia Virginiana (L.), Pers. Fall creek, Va., Blowing Rock.
Robinia hispida, L. Grandfather mountain, Table Rock.
Robinia Pseudacacia, L. Near Grandfather mountain.
Stylosanthes biflora (L.), B.S.P. Faith P. O.
Desmodium canescens (L.), DC. Heilig's Mill.
Desmodium Marylandicum (L.), Boott. Faith P. O.
Lespedeza repens (L.), Bart. Heilig's Mill.
Lespedeza reticulata (Muhl.), Pers. Heilig's Mill.
Lespedeza striata (Thunb.), Hook. and Arn. Heilig's Mill.
Lespedeza Stuvei, Nutt. Heilig's Mill.
Vicia angustifolia, Roth., var. *Bobarti* (Forster), Koch. Danville, Va.
Vicia Caroliniana, Walt. Fall creek, Va., Blowing Rock.
Lathyrus venosus, Muhl. Blowing Rock.

Centrosema Virginianum (L.), Benth. Heilig's Mill.
Clitoria Mariana, L. Hickory.
Phaseolus umbellatus (Muhl.), Britt. Heilig's Mill.
Rhynchosia erecta (Walt.), DC. Falls of Yadkin.
Gleditschia triacanthos, L. Fall creek, Va.
Cassia Chamæcrista, L. Heilig's Mill.
Cassia Marylandica, L. Heilig's Mill.
Cercis Canadensis, L. Heilig's Mill.
Schrankia angustata, T. and G. Hickory.
Prunus Americana, Marsh. Roan Station, Tenn.
Prunus angustifolia, Marsh. Fall creek, Va.
Prunus Pennsylvanica, L. f. Grandfather mountain.
Spiræa Aruncus, L. Fall creek, Va., Blowing Rock, Shull's Mill.
Physocarpa opulifolia (L.), Raf. Shull's Mill, Stone mountain.
Rubus hispidus, L. Near Cranberry.
Rubus villosus, Ait. Grandfather mountain.
Geum Canadense, Jacq. Blowing Rock.
Geum radiatum, Michx. Roan mountain.
Fragaria Virginiana, Mill. Blowing Rock.
Potentilla tridentata, Soland. Blowing Rock, Roan mountain.
Agrimonia striata, Michx. Blowing Rock.
Agrimonia microcarpa, Wallr. Heilig's Mill, Richland valley.
Agrimonia parviflora, Ait. Heilig's Mill.
Rosa rubiginosa, L. Near Grandfather mountain.
Pyrus Americana (Marsh.), DC. Grandfather mountain, Roan mountain.
Pyrus arbutifolia (L.), L. f. Blowing Rock, Faith P. O.
Pyrus nigra (Marsh.), Sargent. Grandfather mountain.
Cratægus flava, Ait. Faith P. O., Falls of the Yadkin.
Cratægus parvifolia. Ait. Hickory, Falls of the Yadkin.
Cratægus spathulata, Michx. Heilig's Mill.
Amelanchier Canadensis (L.), Medik. Blowing Rock, near Grandfather mountain.
Astilbe decandra, D. Don. Stone mountain.
Saxifraga leucanthemifolia, Michx. Blowing Rock, Grandfather mountain, Roan mountain.
Saxifraga micranthifolia (Haw.), B.S.P. Grandfather mountain and near Shull's Mill.

Boykinia aconitifolia, Nutt. Wilson's creek.
Tiarella cordifolia, L. Grandfather mountain.
Heuchera Americana, L. Fall creek, Va.
Heuchera hispida, Pursh. Roanoke, Va.
Heuchera pubescens, Pursh. Hickory, Rip Shin mountain, Rocky Knob.
Heuchera villosa, Michx. Blowing Rock, Grandfather mountain, Roan mountain.
Hydrangea arborescens, L. Blowing Rock.
Itea Virginica, L. Hickory.
Ribes Cynosbati, L. Blowing Rock, Grandfather mountain, Roan mountain (Tenn.)
Ribes prostratum, L'Her. Grandfather mountain.
Ribes rotundifolium, Michx. Grandfather mountain.
Sedum Nevii, A. Gray. Roanoke, Va.
Sedum roseum (L.), Scop. Roan mountain.
Sedum telephioides, Michx. Blowing Rock.
Liquidambar Styraciflua, L. Near Table Rock.
Rhexia Mariana, L. Faith P. O.
Œnothera glauca, Michx. Blowing Rock.
Œnothera fruticosa, L., var. PILOSELLA, (Raf.), (*Œ. Pilosella*, Raf.) Blowing Rock.
Œnothera fruticosa, L., var. *linearis*, (Michx.), S. Watson. Fall creek, Va.
Œnothera sinuata, L. Fall creek, Va., Heilig's Mill.
Circæa alpina, L. Blowing Rock, Grandfather mountain, Roan mountain.
Passiflora incarnata, L. Hickory, Lenoir.
Eryngium aquaticum, L. Hickory, Faith P. O.
Sanicula Canadensis, L. Richland valley, Blowing Rock.
Sanicula Marylandica, L. Blowing Rock, Falls of the Yadkin.
Bupleurum rotundifolium, L. Heilig's Mill.
Cicuta maculata, L. Faith P. O.
Cryptotænia Canadensis, (L.), DC. Blowing Rock.
Pimpinella integerrima (L.), Benth. and Hook. Table Rock.
Osmorhiza Claytoni (Michx.), B.S.P. Roanoke, Va., Banks of Watauga.

† *Osmorhiza longistylis* (Torr.), DC. Blowing Rock.
Discopleura capillacea, Michx. Heilig's Mill.
Ligusticum actæifolium, Michx. Table Rock, Blowing Rock.
Thaspium aureum, Nutt. var. *atropurpureum* (Desr.), Coult. and Rose. Fall creek, Va.
Thaspium barbinode (Michx.), Nutt. Blowing Rock, Roan mountain.
Zizia Bebbii, (Coult. and Rose), Britt. Roanoke, Va., Blowing Rock, Roan Mountain, Stone mountain.
Daucus Carota, L. Heilig's Mill.
Cornus sericea, L. Heilig's Mill.
Nyssa aquatica, L. Blowing Rock.
Nyssa biflora, Walt. Faith P. O.
Sambucus Canadensis, L. Blowing Rock.
Sambucus racemosa, L. Grandfather mountain.
†*Viburnum cassinoides*, L. Shull's Mill.
Viburnum lantanoides, Michx. Grandfather mountain.
Symphoricarpos vulgaris, Michx. Richland valley.
Lonicera glauca, Hill. Shull's Mill.
†*Lonicera Japonica*, Thunb. Hickory.
Lonicera sempervirens, L. Fall creek, Va.
Mitchella repens, L. Grandfather mountain.
Diodia Virginiana, L. Heilig's Mill, Hickory.
Galium latifolium, Michx. Blowing Rock. Cranberry.
Galium trifidum, L. Blowing Rock.
Vernonia Noveboracensis (L.), Willd. Faith P. O.
Elephantopus tomentosus, L. Heilig's Mill.
Eupatorium album, L. Falls of the Yadkin.
Eupatorium hyssopifolium, L. Heilig's Mill.
Liatris graminifolia, Pursh. Blowing Rock.
Liatris spicata (L.), Willd. Faith P. O.
Chrysopsis graminifolia, Nutt. Near the Yadkin.
Solidago Boottii, Hook., var. *Yadkinensis*, Porter, n. var., ined. Near the Falls of the Yadkin, and four miles east of Gold Hill.
Solidago Canadensis, L. Heilig's Mill.
Solidago odora, Ait. Near the Yadkin.
Solidago rugosa, Mill. var. Near the Falls of the Yadkin.

Sericocarpus asteroides (L.), B.S.P. Rocky Knob.
Sericocarpus linifolius (L.), B.S.P. Hickory, Table Rock.
Aster ericoides, L., var. *villosus*, T. and G. Roan mountain, Tenn.
Aster ptarmicoides, T. and G., var. *Georgianus*, A. Gray. Faith P. O.
Aster surculosus, Michx. Near the Yadkin.
Erigeron annuus (L.), Pers. Blowing Rock.
Erigeron bellidifolius, Muhl. var. Shull's Mill, Blowing Rock.
Erigeron ramosus (Walt.), B.S.P. Blowing Rock.
Filago Germanica, L. Gold Hill.
Silphium Asteriscus, L. Faith P. O.
Chrysogonum Virginianum, L. Fall creek, Va., Heilig's Mill.
Parthenium integrifolium, L. Hickory.
Heliopsis helianthoides (L.), B.S.P. Blowing Rock, near Grandfather Hotel.
Rudbeckia fulgida, Ait. Faith P. O., Bilesville.
Rudbeckia hirta, L. Blowing Rock, Hickory.
Rudbeckia laciniata, L. Grandfather mountain.
Coreopsis auriculata, L. Fall creek, Va.
Coreopsis senifolia, Michx., var. *stellata* (Nutt.), T. & G. Blowing Rock, Grandfather mountain, Stone mountain.
Coreopsis verticillata, L. Falls of the Yadkin.
Marshallia lanceolata, Pursh., var. *platyphylla*, M. A. Curtis. Gold Hill.
Helenium nudiflorum, Nutt. Hickory.
Chrysanthemum Leucanthemum, L. Blowing Rock.
Arnica acaulis (Walt.), B.S.P. Hickory.
Senecio aureus, L. Shull's Mill.
Senecio aureus, L., var. *Balsamitae* (Muhl.), T. & G. Roan mountain.
Senecio aureus, L., *angustifolius*, Britt. Fall creek, Va., Heilig's Mill. Blowing Rock mountain.
Senecio Millefolium, T. & G., var. *Memmingeri*, Britt., n. var., ined. Blowing Rock.
Cacalia atriplicifolia, L. Blowing Rock.
Cacalia reniformis, Muhl. Grandfather mountain.
Hieracium Gronovii, L. Faith P. O.

Hieracium venosum, L. Blowing Rock.
Pyrrhopappus Caroliniamus (Walt.), DC. Heilig's Mill.
Sonchus asper, Vill. Faith P. O.
Lobelia cardinalis, L. Heilig's Mill.
Lobelia leptostachys, A. DC. Richland Valley.
Lobelia Nuttallii, R. & S. East of Gold Hill.
Lobelia puberula, Michx. Heilig's Mill and Falls of the Yadkin.
Lobelia spicata, Lam. Fall creek, Va.
Campanula divaricata, Michx. Blowing Rock.
Specularia perfoliata (L.), A. DC. Blowing Rock.
Gaylussacia dumosa (Andr.), T. & G. Hickory, Falls of the Yadkin.
Gaylussacia resinosa (Ait.), T. & G. Blowing Rock.
Vaccinium arboreum, Marsh. Falls of the Yadkin.
Vaccinium erythrocarpon, Mx. Grandfather mountain.
Vaccinium pallidum, Ait. Grandfather mountain, Blowing Rock, Table Rock.
Vaccinium vacillans, Soland. Blowing Rock.
Vaccinium virgatum, Ait., var. *tenellum* (Ait.), A. Gray. Faith P. O.
Gaultheria procumbens, L. Blowing Rock, Grandfather mountain.
Leucothoë Catesbæi (Walt.), A. Gray. Richland Valley.
Leucothoë recurva (Buckley), A. Gray. Blowing Rock.
Oxydendron arboreum (L.), DC. Blowing Rock.
Andromeda ligustrina (L.), Muhl.
Kalmia latifolia, L. Blowing Rock.
Leiophyllum buxifolium (Berg.), Ell., var. *prostratum* (Loud.), A. Gray., Grandfather mountain, Roan mountain, Table Rock.
Rhododendron arborescens (Pursh), Torr. Wilson's creek.
Rhododendron calendulaceum (Michx.), Torr. Blowing Rock.
Rhododendron Catawbiense, Michx. Blowing Rock, Grandfather mountain.
Rhododendron maximum, L. Blowing Rock.
Rhododendron punctatum, Andr. Stone mountain, Table Rock.
Rhododendron Vaseyi, A. Gray. Grandfather mountain.
Rhododendron viscosum (L.), Torr. Hickory, and near Cranberry.

Pyrola rotundifolia, L. Near Cranberry.
Chimaphila maculata (L.), Pursh. Blowing Rock.
Clethra acuminata, Michx. Blowing Rock.
Monotropa uniflora, L. Blowing Rock.
Hypopitys Monotropa, Crantz. Blowing Rock.
Galax aphylla, L Blowing Rock, Table Rock.
Lysimachia quadrifolia, L. Blowing Rock.
Steironema lanceolatum (Walt.), Gray. Hickory.
Symplocos tinctoria (L), L'Her. Blowing Rock.
Halesia tetraptera, L. Aunt Sallie's Ridge.
Fraxinus Americana, L. Falls of the Yadkin.
Fraxinus pubescens, Lam. Heilig's Mill.
Fraxinus viridis, Michx. f. Heilig's Mill.
Chionanthus Virginica, L. Stone mountain.
† *Ligustrum vulgare*, L. Blowing Rock, John's River Valley.
Asclepias exaltata (L.), Muhl. Blowing Rock, Linville.
Asclepias incarnata, L., var. *pulchra* (Ehrh.), Pers. Faith P. O.
Asclepias obtusifolia, Michx. Hickory.
Asclepias quadrifolia, L. Blowing Rock.
Asclepias tuberosa, L. Blowing Rock, Hickory.
Asclepias variegata, L. Blowing Rock.
Asclepias verticillata, L. Faith P. O., Falls of the Yadkin.
Gonolobus Carolinensis (Jacq.), R. Br. Roanoke, Va.
Gonolobus hirsutus, Michx. Faith P. O.
Sabbatia angularis (L.), Pursh. Heilig's Mill.
Sabbatia paniculata (L.), Pursh. Faith P. O.
Phlox amœna, Sims. Hickory.
Phlox glaberrima, L. Fall creek, Va., and near Cranberry.
Phlox maculata, L. Danville, Va.
Phlox ovata, L. Fall creek, Va.
Phlox reptans, Michx. Grandfather mountain.
Hydrophyllum Canadense, L. Blowing Rock.
Hydrophyllum Virginicum, L. Blowing. Rock, Grandfather mountain.
Phacelia bipinnatifida, Michx. Blowing Rock.
Heliotropium Indicum, L. Falls of the Yadkin.
Cynoglossum officinale, L. Doe river, Tenn.
Myosotis laxa, Lehm. Doe river, Tenn.

Onosmodium Carolinianum (Lam.), DC. Fall creek, Va.
Ipomæa lacunosa, L. Heilig's Mill.
Convolvulus repens, L. Shull's Mill.
Solanum Carolinense, L. Blowing Rock.
Physalis Philadelphica, Lam. Shull's Mill.
Linaria Canadensis (L.), Dumont. Danville, Va.
Scrophularia nodosa, L., var. *Marylandica* (L.), A. Gray. Blowing Rock.
Chelone Lyoni, Pursh. Grandfather mountain.
Pentstemon lævigatus, Soland. Heilig's Mill.
Pentstemon lævigatus, Soland., var. *canescens*, Britt. Roanoke, Va., Hickory.
Mimulus alatus, Soland. Heilig's Mill.
Herpestis nigrescens, Benth. Heilig's Mill.
† *Veronica Anagallis*, L. Roan Station, Tenn., Cranberry.
Gerardia lævigata, Raf. Blowing Rock, Roan mountain.
Gerardia pedicularia, L., var. *pectinata*, Nutt. Heilig's Mill.
Castilleia coccinea (L.), Spreng. Heilig's Mill.
Melampyrum lineare, Lam. Cranberry.
Aphyllon uniflorum (L.), A. Gray. Blowing Rock.
Conopholis Americana (L. f.), Wallr. Shull's Mill.
Bignonia capreolata, L. Heilig's Mill, Falls of the Yadkin.
Tecoma radicans (L.), Juss. Heilig's Mill.
Martynia proboscidea, Glox. Faith P. O.
Ruellia ciliosa, Pursh. Heilig's Mill.
Ruellia strepens, L. Roanoke, Va.
Verbena angustifolia, Michx. Roanoke.
Verbena officinalis, L. Hall's Store, Heilig's Mill, Hickory, Roan Station, Tenn.
Verbena riparia, Raf. John's River valley, Falls of the Yadkin.
Lycopus Virginicus, L. Blowing Rock.
Pycnanthemum Tullia, Benth. Blowing Rock, Heilig's Mill, Richland Valley.
Calamintha Clinopodium, Benth. Cranberry.
Calamintha Nepeta (L.), Link. Faith P. O.
Monarda clinopodia, L. Blowing Rock.
Monarda didyma, L. Grandfather mountain, Roan mountain, Tenn.

Blephilia hirsuta (Pursh), Benth. Blowing Rock.
Scutellaria integrifolia, L. Hickory.
Scutellaria nervosa, Pursh. Roanoke, Va.
Scutellaria pilosa, Michx. Hickory, Aunt Sallie's Ridge.
Brunella vulgaris, L. Blowing Rock.
Physostegia Virginiana (L.), Benth., var. *speciosa* (Sweet.), A. Gray. Faith P. O.
Marrubium vulgare, L. Roanoke, Va., Roan Station.
Stachys aspera, Michx. Blowing Rock, Grandfather mountain.
Isanthus brachiatus (L.), B.S.P. Faith P. O.
Paronychia argyrocoma, Nutt. Blowing Rock, Stone mountain.
Anychia Canadensis (L.), B.S.P. Blowing Rock.
Polygonum Hydropiper, L. Blowing Rock.
Polygonum hydropiperoides, Michx. Heilig's Mill.
Polygonum Persicaria, L. Blowing Rock.
Fagopyrum esculentum, Mœnch. Grandfather mountain.
Rumex Acetosella, L. Blowing Rock.
Asarum arifolium, Michx. Heilig's Mill.
Asarum Canadense, L. Grandfather mountain.
Asarum Virginicum, L. Fall Creek, Va., Blowing Rock.
Asarum Virginicum, L., var. *grandiflorum*, Mx. Wilson's creek.
Aristolochia Siphо, L'Her. On the Watauga river.
Pyrularia pubera, Michx. Wilson's creek.
† *Euphorbia marginata*, Pursh. Salisbury.
Ulmus alata, Michx. Falls of the Yadkin.
Morus rubra, L. Roanoke, Va.
Platanus occidentalis, L. Heilig's Hill.
Juglans nigra, L. Faith P. O.
Betula lutea, Michx. f. Blowing Rock.
Alnus viridis, DC. Roan mountain, Tenn.
Carpinus Americana, Lam. Roan mountain, Tenn.
Quercus aquatica, Walt. Falls of the Yadkin.
Castanea pumila, Michx. Blowing Rock.
Microstylis unifolia (Michx.), B.S.P. Blowing Rock.
Liparis liliifolia (L.), Rich. Richland Valley, Wilson's creek.
Tipularia unifolia (Muhl.), B.S.P. Falls of the Yadkin.
Bletia aphylla, Nutt. Heilig's Mill.
Listera convallarioides, Nutt. Shull's Mill.

Speiranthes gracilis, Bigel. Heilig's Mill, Stone mountain.
Goodyera pubescens (Willd.), R. Br. Blowing Rock.
Goodyera repens (L.), R. Br. Grandfather mountain.
Calopogon tuberosus (L.), B.S.P. Hickory, Table Rock.
Pogonia divaricata (L.), R. Br. Blowing Rock, Grandfather mountain, Hickory, Table Rock.
Pogonia verticillata (Willd.), Nutt. Wilson's creek.
Habenaria ciliaris (L.), R. Br. Gold Hill.
Habenaria fimbriata (Ait.), R. Br. Roan mountain.
Habenaria flava (L.), A. Gray. Roan mountain, Tenn.
Habenaria orbiculata (Pursh), Torr. Blowing Rock, Grandfather mountain.
Cypripedium acaule, Ait. Blowing Rock.
Cypripedum pubescens, Willd. Cranberry.
Aletris farinosa, L. Stone mountain.
Sisyrinchium angustifolium, Mill. Cranberry.
Sisyrinchium angustifolium, Mill., forma *albiflorum* (Raf.), Britt. Fall creek, Va.
Smilax Bona-nox, L. Heilig's Mill.
Smilax glauca, Walt. Blowing Rock.
Smilax rotundifolia, L. var. *crenulata*, Small and Heller. Grandfather mountain, Richland Valley.
Polygonatum biflorum (Walt.), Ell. Blowing Rock.
Streptopus roseus (Pers.), Michx. Grandfather mountain.
Allium cernuum, Roth. Blowing Rock.
Allium mutabile, Michx. Heilig's Mill.
Allium tricoccum, Ait. Grandfather mountain, Roan mountain.
Allium vineale, L. Hickory.
Lilium superbum, L. Grandfather mountain.
Chamælirium luteum (L.), A. Gray. Fall creek, Va., Blowing Rock.
Xerophyllum asphodeloides (L.), Spreng. Blowing Rock, Grandfather mountain, Table Rock.
Uvularia puberula, Michx. Blowing Rock.
Disporum lanuginosum (Michx.), Britt. Blowing Rock, Grandfather mountain.
Clintonia borealis (Ait.), Raf. Grandfather mountain.
Clintonia umbellata (Poir.), Torr. Grandfather mountain.

Trillium erectum, L. Grandfather mountain.
Melanthium parviflorum (Michx.), S. Wats. Blowing Rock, Grandfather mountain.
Zygadenus leimanthoides, A. Gray. Grandfather mountain.
Amianthium angustifolium (Michx.), A. Gray. Hickory.
Amianthium muscætoxicum (Walt.), A. Gray. Blowing Rock, Cranberry, Table Rock.
Commelina hirtella, Vahl. Heilig's Mill.
Tradescantia pilosa, Lehm. Blowing Rock.
Juncus acuminatus, Michx. Roan Station, Tenn.
Juncus dichotomus, Ell. Hickory.
Juncus marginatus, Rostk. Roan Station, Tenn., Hickory.
Juncus scirpoides, Lam. Heilig's Mill.
Juncus setaceus, Rostk. Heilig's Mill.
Juncus tenuis, Willd. Roan Station, Tenn., Grandfather mountain.
Luzula campestris (L.), DC. Stone mountain, Table Rock.
Arisæma polymorphum (Buckl.), Chap. Grandfather mountain.
Eriocaulon decangulare, L. Hickory.
Cyperus flavescens, L. Heilig's Mill.
Cyperus ovularis (Vahl), Torr. Heilig's Mill.
Cyperus retrofractus, (Torr.), A. Gray. Falls of the Yadkin.
Cyperus strigosus, L. Heilig's Mill.
Kyllingia pumila, Michx. Heilig's Mill.
Eleocharis ovata (Roth), R. Br. Roan Station, Tenn.
Fimbristylis capillaris (L.), A. Gray. Stone Mountain.
Scirpus cæspitosus, L. Roan mountain, Table Rock.
Scirpus polyphyllus, Vahl. Richland Valley.
†*Scirpus sylvaticus*, L. Hickory.
Rhynchospora cymosa (Willd.), Nutt. Stone Mountain.
Carex æstivalis, M. A. Curtis. Roan Mountain, Tenn., Blowing Rock.
Carex debilis, Michx. Grandfather mountain.
Carex Fraseri, Andrews. Aunt Sallie's Ridge, Grandfather mountain, Richland Valley.
Carex juncea, Willd. Roan mountain.
Carex Pennsylvanica, Lam. Roan mountain, Tenn.
Carex rosea, Schk. Blowing Rock.

Carex scoparia, Schk. Blowing Rock.
Carex vulpinoidea, Michx. Hickory.
Andropogon dissitiflorus, Michx. Heilig's Mill.
Paspalum Floridanum, Michx. Faith P. O.
Paspalum læve, Michx. Heilig's Mill.
Panicum clandestinum, L. Heilig's Mill.
Panicum commutatum, Schultes. Fall creek, Va.
Panicum depauperatum, Muhl. Blowing Rock.
Panicum dichotomum, L. Blowing Rock, Table Rock, Stone mountain,
Panicum microcarpon, Muhl. Hickory, Wilson's creek.
Panicum scoparium, Lam. Hickory.
Panicum viscidum, Ell. Hickory.
Setaria glauca (L.), Beauv. Blowing Rock.
Stipa avenacea, L. Fall creek, Va.
Sporobolus Indicus (L.), R. Br. Hickory.
Agrostis perennans (Walt.), Tuck. Grandfather mountain.
Deschampsia flexuosa (L.), Griseb. Roan Mountain.
Arrhenatherum elatius (L.), Mert. and Koch. Blowing Rock.
Danthonia compressa, Austin. Blowing Rock.
Eleusine Ægyptiaca (L.), Pers. Falls of the Yadkin.
†*Eatonia Dudleyi*, Vasey. Shull's Mill.
Eatonia Pennsylvanica (Spreng.), A. Gray. Fall creek, Va.
Poa compressa, L. Green's Hill, (Blowing Rock).
Glyceria elongata (Torr.), Trin. Grandfather mountain.
Festuca Myurus, L. Danville, Va., Heilig's Mill.
Festuca octoflora, Walt. Danville, Va.
Lolium temulentum, L. Heilig's Mill.
Pinus echinata, Mill. Heilig's Mill.
Pinus pungens, Michx. f. Blowing Rock.
Pinus rigida, Mill. Rocky Knob.
Picea Mariana (Mill.), B.S.P. Grandfather mountain.
Tsuga Canadensis (L.), Carr. Blowing Rock.
Tsuga Caroliniana, Engelm. Blowing Rock.
Abies Fraseri, Lindl. Grandfather mountain.
Juniperus Virginiana, L. Heilig's Mill.
Selaginella rupestris (L.), Spring. Blowing Rock, Table Rock.
Lycopodium lucidulum, Mx. Grandfather mountain.

Lycopodium obscurum, L. Grandfather mountain.
Lycopodium Selago, L. Roan mountain.
Botrychium Virginianum (L.), Sw. Shull's Mill, Grandfather mountain.
Polypodium vulgare, L. Grandfather mountain.
Polypodium incanum, Pursh. Blowing Rock, Falls of the Yadkin, Wilson's creek.
Asplenium Filix-fœmina (L.), Bernh. Grandfather mountain.
Asplenium montanum, Willd. Blowing Rock, Grandfather mountain.
Asplenium parvulum, Mart. and Gal. Falls of the Yadkin.
Asplenium platyneuron (L.), Oakes. Aunt Sallie's Ridge, Falls of the Yadkin.
Asplenium Trichomanes, L. Falls of the Yadkin.
Aspidium marginale (L.), Sw. Stone mountain.
Aspidium spinulosum, Sw., var. *dilatatum* (Sw.), Hook.
Dicksonia punctilobula (Michx.), A. Gray. Blowing Rock.

LIST OF MOSSES.

By John K. Small.

Not much attention could be paid to the collecting of mosses, but specimens were picked up here and there on the journey, and the following list, giving the stations at which each species was gathered, may be of use and interest. My thanks are due to Mrs. Britton for help in the determination of some of the difficult species and corrections on my work.

Sphagnum cymbifolium, Ehrh. Swamp near Hickory.
Sphagnum rigidum, Schimp. Swamp near Hickory.
Sphagnum ———. Sandy bank of Wilson's creek.
Andreæa rupestris, Turn. Summit of Table Rock mountain.
Dicranella heteromalla (L.), Schimp. Blowing Rock mountain, Grandfather mountain.
Dicranum flagellare, Hedw. Grandfather mountain, Blowing Rock mountain.
Dicranum fulvum, Hooker. Blowing Rock mountain, Watauga river, Grandfather mountain.
Dicranum scoparium (L.), Hedw. Blowing Rock mountain.
Leucobryum glaucum (L.), Schimp., var. *albidum*, W. & M. Blowing Rock mountain.
Ditrichum pallidum (Schreb.), Hampe. Hickory.
Grimmia campestris, Burchell. Rocky Knob mountain.
Grimmia Pennsylvanica, Schwægr. Along Watauga river, Grandfather mountain.
Racomitrium aciculare (L.), Brid. Grandfather mountain.
Weissia Americana (Beauv.), Lindb. Rocky Knob mountain, Table Rock mountain.
Weissia crispula (Bruch.), Lindb. Grandfather mountain.
Weissia Ludwigii (Brid.). Blowing Rock mountain.
Weissia ulophylla, Ehrh. Grandfather mountain, Blowing Rock mountain.
Bartramia pomiformis, Hedw. Grandfather mountain.

Philonotis fontana (L.), Brid. Table Rock mountain, Grandfather mountain.

Bryum roseum, Schreb. Grandfather mountain.

Mnium rostratum, Schwægr. Grandfather mountain.

Mnium cuspidatum, Hedw. Blowing Rock mountain.

Polytrichum formosum, Hedw. Grandfather mountain, Blowing Rock mountain.

Neckera pennata, Hedw. Grandfather mountain, Aunt Sallie's ridge, Blowing Rock mountain.

Leucodon brachypus, Brid. Blowing Rock mountain, Rocky Knob mountain, Grandfather mountain.

Leucodon julaceus (Hedw.), Sulliv. Heilig's Mill P. O., Gold Hill.

Leskea tristis, Cesat. On rocks near the Watauga river.

Anomodon apiculatus, Bruch. & Schimp. Grandfather mountain, Blowing Rock mountain.

Anomodon attenuatus, Hueben. Aunt Sallie's ridge, Blowing Rock mountain.

Anomodon obtusifolius, Bruch. & Schimp. Grandfather mountain, Blowing Rock mountain.

Anomodon rostratus, Schimp. Blowing Rock mountain.

Pylaisia velutina, Bruch. & Schimp. Blowing Rock mountain.

Hypnum Boscii, Schwægr. Along Bear creek.

Hypnum brevirostre, Ehrh. Grandfather mountain.

Hypnum chrysophyllum, Brid. Blowing Rock mountain.

Hypnum chrysophyllum, Brid., var. *minus* (Sulliv and Lesq.) Blowing Rock mountain.

Hypnum cupressiforme, L. Blowing Rock mountain.

Hypnum curvifolium, Hedw. Grandfather mountain.

Hypnum delicatulum, L. Grandfather mountain.

Hypnum eugyrium, Schimp. Grandfather mountain.

Hypnum filicinum, L. Grandfather mountain.

Hypnum gracile, Bruch. and Schimp. Grandfather mountain.

Hypnum gracile, Bruch. and Schimp., var. *Lancastriense*, Sulliv. and Lesq. Blowing Rock mountain.

Hypnum imponens, Hedw. Crossing of the Blue Bidge, Grandfather mountain.

Hypnum lætum, Brid. Blowing Rock mountain, Grandfather mountain.

Hypnum micans, Sw., var. Summit of Roan and Grandfather mountains.

Hypnum orthocladon, Beauv. Crossing of the Blue Ridge.

Hypnum pallescens, Beauv. Blowing Rock mountain, Aunt Sallie's ridge, Grandfather mountain.

Hypnum pallescens, Beauv., var. *protuberans* (Brid.) Grandfather mountain.

Hypnum plumosum, Sw. Aunt Sallie's ridge, Grandfather mountain.

Hypnum recognitum, Hedw. Grandfather mountain, Rock Knob mountain.

Hypnum recurvans, Schwægr. Blowing Rock mountain, Grandfather mountain.

Hypnum rugosum, L. On the "Blowing Rock."

Hypnum scitum, Beauv. Aunt Sallie's ridge, Blowing Rock mountain.

Hypnum serpens, L. Blowing Rock mountain.

Hypnum serrulatum, Hedw. Grandfather mountain.

Hypnum proliferum, L. Grandfather mountain.

Hypnum Sullivantii, Spruce. Table Rock mountain.

Hypnum triquetrum, L. Grandfather mountain.

Hypnum velutinum, L. Grandfather mountain.

Hypnum nemorosum, Koch. Grandfather mountain.

Hypnum salebrosum, Hoffm. Grandfather mountain.

Hypnum radicale, Beauv. Blowing Rock and Grandfather mountains.

Plagiothecium denticulatum (L.), Br. and Sch. Grandfather mountain.

MEMOIRS

OF THE

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THE NAIADACEÆ

—OF—

NORTH AMERICA.

BY THOMAS MORONG.

(PLATES XX–LXXIV.)

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The Naiadaceæ of North America.

By Thomas Morong.

(Plates XX.—LXXIV.)

The first botanist to reduce the North American species of *Potamogeton* to anything like a complete and intelligible systematic shape was Dr. J. W. Robbins, of Uxbridge, Mass. To his pen is due the description in Gray's Manual, edition 5, of the species within the range of that work. To this he added in the Botany of King's Expedition an account of the species found in Nevada, Utah and the adjoining regions, completing his work in the Botany of California by Brewer and Watson by a determination of the species on the Pacific coast which were then known. At his death, in 1875, Dr. Robbins bequeathed to me his collections, containing not only the gatherings of many years by his own hand, but also specimens from the Herbarium of Tuckerman, one of the earliest students of this genus, and from Oakes, his close friend and collaborator, in whose lamented early death our country lost one of its most promising naturalists. Dr. Robbins left with his Herbarium an injunction that his plants should be distributed as widely as possible. I feel, therefore, that I am executing a sacred trust in issuing a monograph upon the Order that includes as its principal part the family upon which my friend expended so much thought. Besides this, the paper here presented includes not only the embodiment of my friend's most cherished convictions, but the results of my own studies in a personal exploration of nearly all the waters from Quebec to Virginia, and from the Atlantic to the Mississippi. This monograph, however,

would have been impossible, at least in its present form, except for the assistance of friendly European botanists to whom I am indebted for large suites of specimens and invaluable counsel. With Mr. Arthur Bennett, of Croydon, England, distinguished for his extensive acquaintance with *Potamogeton* forms in all parts of the world, and for his contributions to the literature of the subject, I have enjoyed a correspondence covering the last twelve years, and during the course of that time have received from him specimens of *Naias*, *Zanichellia*, *Ruppia*, *Zostera* and *Potamogeton*, which represent nearly all the species of these families known to European Herbaria. His generous assistance has not ended here, but he has examined for me the materials at Kew, the London Museum of Natural History, Berlin and the Herbarium of Linnæus, so that I feel as well acquainted with these great collections as if I had visited them in person. I am also much beholden to that acute botanist of Cambridgeshire, England, Mr. Alfred Fryer, for beautiful specimens of the various interesting forms of Potamogeton which occur in the fens about Chatteris, and for many original and discriminating analyses. Elegant specimens of the Northern Scandinavian forms have been contributed by Dr. Gustaf Tiselius, of Stockholm, than whom no one is a better judge of the Continental species of Potamogeton. The late Prof. Caspary, of Königsburg, Prussia, was another of my European correspondents, from whom was received many valuable specimens. The collections of the Harvard Herbarium, of Columbia College, the Academy of Sciences at Philadelphia, and at the National Herbarium at Washington have been freely submitted for examination, as well as the large private collections of Mr. Canby, of Wilmington, Delaware, I. C. Martindale, of Camden, New Jersey, and others. Indeed, I may say that there is scarcely a collector of pond weeds in the country with whom I have not at one time or other held correspondence, and from whom I have not received specimens. And yet, notwithstanding these advantages for a wide comparison and a close study of this group of plants, so protean are their forms, so eccentric their action, constantly changing under changed conditions of season and water, that I put forth this treatise with great diffidence, and feel that the subject is very far from being exhausted

The Naiadaceæ are for the most part strictly aquatic plants, arising from long, sometimes nodose, rhizomes. Two of the genera now included in the order, *Triglochin* and *Schuchzeria*, are inhabitants of bogs and marshes; while another, *Lilæa*, usually begins its life under water, but continues to grow in the mud after its native water has subsided. *Triglochin* and *Lilæa* bear their inflorescence on scapes, the remainder on branching and leafy stems. The aquatics are normally submerged plants, but some of the *Potamogeton* family bear two kinds of leaves, floating and submerged. The leaves are properly sheathing at the base, and this appears in all the genera, except in some species of *Potamogeton*. Even these, however, as in the group of which *P. pectinatus* may be considered as the type, the so-called stipule is adnate to the base of the leaf and forms with it a sheath, produced at its extremity into a sort of ligule. In the other species this organ, though, for want of a better name, it is termed a stipule, is much more in the nature of a spathe that at first encloses the young buds, remaining afterwards at the base of the elongated nodes, petioles and peduncles as an appendage which soon decays. In *Zostera* and *Phyllospadix* the spathaceous character is still more developed as the flowers are borne on true spadices contained in a foliaceous sheath or spathe. Flowers perfect, monœcious or diœcious, either naked, tubular, or with a perianth of 4 to 6 distinct herbaceous segments. Stamens 1 to 6, occasionally more, distinct and hypogynous in the perfect flowers, solitary or connate in the unisexual, with extrorse 1–2-celled anthers. Ovaries 1 to 6, distinct or rarely connate, 1-celled; containing in our North American species, with few exceptions, a single ovule. Fruit, various; capsular, follicular or drupaceous. The fruit in the *Zosteræ* is usually termed an utricle, but, while having a membranaceous pericarp, it is frequently, at least, if not always, dehiscent. Seed straight or curved; the embryo corresponding, orthotropous, anatropous or campylotropous, without albumen.

From this brief characterization it will be seen that the order is composed of several heterogeneous groups. With the exception of the Juncagineæ and Lilaeæ the order is a natural one. These two groups have long hovered between Alismaceæ, Aroideæ and Naiadaceæ, with all of which they are more or less closely allied,

and yet they are really distinct from either, and a rigid classification would certainly follow the arrangement of Micheli in D. C. Mon. Phan., and constitute each of them a separate order. *Lilæa* is anomalous, and quite as distinct from the Juncagineæ as the latter are from Naiadaceæ. There is an advantage, however, in placing closely allied groups under one order, if possible, and I therefore follow essentially the arrangement of Bentham and Hooker.

Sub-order I. JUNCAGINEÆ.

Marsh plants with rush-like leaves. Flowers spicate or racemose, perfect. Perianth 4-6-parted; segments in two series. Stamens 3-6. Carpels 3 or 6, 1-2-ovuled, more or less united while immature, dehiscent or indehiscent. Seeds anatropous, embryo straight.

1. TRIGLOCHIN.

Flowers ebracteate, racemose. Perianth segments 3 or 6. Carpels 3 or 6, united until maturity. Leaves all radical.

2. SCHEUCHZERIA.

Flowers bracteate, racemose. Perianth segments 6. Stamens 6. Carpels 3, distinct, stem leafy, rush-like; fruit a follicle.

Sub-order II. LILAEÆ.

Marsh plants with cylindrical leaves. Flowers dimorphous, solitary and in spikes, monœcious. Perianth none or a single bract. Stamen 1, ovary 1, ovule 1, anatropous. Carpels indehiscent.

3. LILAEA. Flowers monœcious, the pistillate naked at the base of the leaves, with very long styles, or in close spikes on scapes; the staminate in close spikes, on scapes, under a single bract. Carpel 1, 1-seeded.

Sub-order III. NAIADEÆ.

Immersed aquatics with flat leaves. Flowers variously arranged, perfect, monœcious or diœcious. Perianth of 4 segments, or a mere hyaline envelope. Ovaries solitary or distinct, 1-ovuled. Carpels rarely dehiscent. Embryo curved or straight.

§ Potameæ.

Flowers spicate, perfect, bractless. Perianth of 4 segments or none. Stamens 4 or 2. Carpels separate, 1-seeded; seeds campylotropous. Embryo curved.

4. POTAMOGETON.

Perianth segments 4. Carpels sessile.

5. RUPPIA.

Perianth none. Carpels long-stipitate. Fruit in umbels.

§ Zannichelliæ.

Flowers axillary. Perianth none or hyaline. Stamen 1 with elongated filament, or of 2 or 3 connate, sessile anthers. Ovaries 2–9, 1-ovuled; ovules pendulous from the top of the cell, orthotropous.

6. ZANNICHELLIA.

Perianth none. Stamen 1, with a short filament. Carpels 2–9, a little curved. Fruit in umbels.

§ Naiæ.

Flowers monœcious or diœcious, axillary. Perianth a hyaline envelope. Stamens of 1 sessile or 2 connate anthers. Ovaries solitary, 1-ovuled; ovules anatropous. Embryo oblong.

7. NAIAS.

Flowers solitary or glomerate.

§ Zostereæ.

Marine plants with long linear leaves. Flowers monœcious or diœcious, on an enclosed spadix. Perianth none. Ovaries 1, sessile, 1-ovuled; ovules pendulous, orthotropous. Embryo straight.

8. ZOSTERA.

Flowers monœcious. Carpels ovoid.

9. PHYLLOSPADIX.

Flowers diœcious. Carpels heart-shaped.

1. TRIGLOCHIN, L. Sp. Pl. 338 (1753).

Marsh plants with radical, semiterete, fleshy leaves, which have membranous, often ligulate, sheaths at the base. Flowers perfect, in spikes or racemes, on long, smooth, naked scapes. Segments of the perianth 3–6, concave, the 3 inner inserted higher than the others. Stamens 3–6; anthers 2-celled, sessile or nearly so, inserted at the base of the segments and attached by the back, extrorse and with the segments deciduous. Ovaries 6, united or

rarely free, 1-celled, sometimes partially or wholly abortive; ovules solitary, basilar, erect, anatropous; style short or often wanting; stigmas as many as the ovaries, plumose. Fruit of 3–6 cylindraceous, oblong or obovoid carpels, which are distinct or connate, coriaceous, costate, when ripe separating from the base upward from a persistent central axis, the tips straight or recurved, dehiscing by a ventral suture. Seeds erect, cylindraceous or ovoid-oblong, compressed or angular. Embryo conformed to the seeds.

The carpels often appear indehiscent in the dried specimens, but they are all furnished with a distinct internal carinated suture which it may need moisture to open. The species have a rush-like appearance, and are generally found upon saline marshes near the seashore or inland, and often, also, in fresh water bogs and marshes. The long, linear leaves are usually erect, sheathing each other and the scape at the base, often partially buried in the earth.

Authors vary much as to the number of species, Kunth enumerating 16, which Micheli reduces to 9. They are widespread, inhabiting the frigid and temperate zones of both hemispheres.

Three species only occur in North America.

Carpels 3.

Fruit linear or clavate, tapering to a subulate base. 1. *T. palustris.*

Fruit globose. 2. *T. striata.*

Carpels 6.

Fruit oblong or ovate, obtuse at base. 3. *T. maritima.*

1. TRIGLOCHIN PALUSTRIS, L. Sp. Pl. 338 (1753).

Perennial. Rhizome short, oblique, throwing out radical fibres and slender, fugacious stolons. Leaves narrowly linear, shorter than the scapes, 5–12 inches long, tapering to a sharp point; ligule very short. Scapes 1–2 from the same rootstock, very slender, striate, 8–20 inches high. Racemes 5–12 inches in length; pedicels capillary, in fruit erect-appressed and 2½–3½ lines long. Perianth segments 6, greenish-yellow, ovate or roundish, in 2 series, the inner a little higher. Anthers 6, sessile, in 2 series, each under a perianth segment, large, yellow. Ovaries of 3 united carpels and as many cells and ovules; stigmas as many as the carpels, sessile, plumose. Fruit 3–3½ lines long, slender, linear or clavate, tapering into a base scarcely thicker than the pedicel and tipped with 3 short recurved points. Ripe carpels

cylindrical, tapering at base into a sharp hair-like termination, separating upwardly from the axis, and hanging suspended from its apex; central axis 3-winged. Seeds loose in the carpels, straight, the raphe marked by a purple line.

This species is readily recognized by its very slender, erect scapes, and its racemes of slender, erect, club-shaped and long capillary pedicels.

It grows in boggy places or sometimes in slightly wet grounds, or in moist sands by brooksides and brackish pools and ponds. I found it quite abundant near the Niagara Falls on the Canada side. It also occurs at various localities in Western New York, and thence westward to Montana (Belt River Canyon, Williams) and northward through Canada from New Brunswick to Alaska (Macoun). Common in the British Islands and throughout Europe and Northern Asia. (Plate XX, with a ripe fruit magnified.)

2. TRIGLOCHIN STRIATA, R. and P. Fl. Peruv. iii. 72 (1802).

T. triandra, Mx. Fl. i. 208 (1803).

Small perennials from upright or oblique, stoloniferous rootstocks. Scapes 1 or 2 from the same rhizome, more or less angular, usually not over 10 inches high, but sometimes reaching an altitude of 14 inches. Leaves slender, slightly fleshy, nearly or quite as long as the scapes and ¼-1 line in width. Flowers very small, light yellow or greenish, in spikes or racemes, with pedicels only ½-¾ line long, not increasing in fruit, the spikes 1-5 inches in length. Perianth segments 3; stamens 3, oval, large. Ovaries 3, united, crowned with long plumose stigmas. Fruit globose, ¾-1 line in diameter, appearing 3-winged when dry by the contraction of the carpels. Carpels 3, coriaceous, rounded and 3-ribbed on the back. Central column broadly 3-winged, the wings composed of a thin membrane with a strong rib-like border. Seeds loose, slightly curved, the raphe inconspicuous.

Our species belong to the form called *robustior* by Micheli. Two other smaller and more slender forms are described, named *filifolia* and *humilis*, the former from the Pacific islands and the latter from Chile.

T. striata seems to take the place of our other species in the Southern States, occurring along the seaboard from Maryland to

Louisiana in salt and fresh water marshes. A widely diffused species, native not only of the United States, but also of Brazil, Chile, many of the Pacific Islands and Southern Africa. (Plate XXI, with a ripe fruit magnified.)

3. TRIGLOCHIN MARITIMA, L. Sp. Pl. 339 (1753).
T. Mexicana, H. B. K. Nov. Gen., i. 244 (1815).
T. elata, Nutt. Gen. i. 237 (1818).
T. maritima, var. *elata*, A. Gray, Man. Ed. 2, 437 (1852).

A perennial plant with a long, unstoloniferous, often subligneous, rootstock, and a thick caudex which is usually covered with the sheaths of old leaves. Scapes stout, nearly terete, striate, 12 to 24 inches high, commonly solitary. Leaves much shorter than the scapes, fleshy, semi-cylindrical, striate, tapering gradually to a long acute or obtuse point. The leaves are usually about 1 line broad, but sometimes, as in a specimen collected in California by Dr. Bigelow, on Lieut. Whipple's expedition, reaching a width of nearly 2½ lines. Flowers very numerous, often densely crowded on the scape, and even appearing verticillate at times. The racemes often reach a length of 40 cm. or more; pedicels decurrent, 1 to 1½ lines long, slightly increasing in fruit. Perianth segments, 6, the 3 interior smaller, ovate and greenish-white, each subtending a large sessile anther. Ovaries 6, united, each 1-celled and 1-ovuled; stigmas sessile, plumose. Fruit 2½ or 3 lines long and 1½ to 2 lines thick, oblong or ovate, obtuse at the base, with 6 recurved points at the apex. Carpels 6, 3-angled, flat or slightly grooved on the back, or the dorsal edges curving upwards and sharply winged (*T. elata*, Nutt.), separating at maturity from a hexagonal axis; seeds much smaller than the thick membranous carpels, straight or slightly curved; raphe not conspicuous.

The distinctions between this species and the form *elata* of Nuttall, depending upon the presence or absence of wings on the carpels, are too inconstant to warrant even the making of a variety.

T. maritima generally occurs on salt marshes, along the seacoast and on saline grounds in the interior of the country, but is not uncommon in fresh marshes, It is widely spread on our continent from Labrador to New Jersey, and westward to Alaska and California. From Southern Mexico to Terra del Fuego, and in Europe and Asia it is equally common. (Plate XXII.)

2. SCHEUCHZERIA, L. Sp. Pl. 338 (1753).

Rush-like bog perennials with creeping rootstocks and erect, leafy stems. Leaves semiterete below and plane above, striate, furnished with a pore at the apex and a membranous, ligulate sheath at the base. Flowers small, racemose. Perianth 6-parted, regular, biserial, persistent. Stamens 6, biserial, inserted at the base of the segments; filaments elongated; anthers linear, basifixed, extrorse. Ovaries 3, rarely 4–6, separate or connate at the base, 1-celled, each cell containing one or two collateral ovules. Stigmas sessile, papillose or slightly fimbriate. Carpels 3–6, shortly connate at base, divergent, inflated, coriaceous, 1–2 seeded. Fruit a follicle, thick, flattish-oval, dehiscing laterally, containing one or two smooth seeds which have a clearly marked raphe and a thick hard testa. Seeds exalbuminous, straight or slightly curved, loose in the carpel.

Only one species is known.

1. SCHEUCHZERIA PALUSTRIS, L. Sp. Pl. 338 (1753).

Leaves 4–16 inches long, the cauline diminishing to bracts among the inflorescence. Stems one or more, rising from a long creeping rootstock, and usually clothed at the base with the remains of old leaves, 4–10 inches in height; sheaths on the radical leaves often 4 inches in length, with a ligule nearly 5 lines long. Pedicels 3–10 lines long, spreading in fruit. Flowers white, few, in a lax raceme; perianth segments acute or obtuse, membranaceous, 1-nerved, 1½ lines long, the inner ones narrower. Stamens 2½–3 lines long. Follicles 3–4 lines in length, divergent, only slightly, if at all united at the base. Seeds oval, fuscous, 2½ or 3 lines in length, with a very hard testa.

This plant occurs rather rarely in deep quaking bogs, among moss and grass, from New Brunswick to Hudson's Bay in Canada, from New England to New Jersey, and westward to Washington and California. It is also an inhabitant of Northern Europe and Asia. (Plate XXIII. with a flower magnified.)

3. LILÆA, Humb. et Bonpl. Pl. Æq. i. 221 (1808).

Annual stemless, paludose plants, with simple, slender scapes and radical leaves which are slightly dilated at the base. Flowers monœcious and dimorphous, the one sort solitary, fertile and dis-

posed among the leaves at the base, with long, thread-like styles. The other kind of flowers are monœcious, in dense spikes at the apex of slender scapes. Staminate flowers imbricated in narrow, oblong spikes; stamen of a single, 2-celled anther nearly sessile, in the axis of a white, linear, petaloid bract longer than itself. Fertile flowers imbricated in larger, conical, crowded spikes, bractless, consisting of a 1-celled, 1-ovuled ovary which is tipped with a capitate stigma; ovules anatropous. Fruit ovoid, costate, indehiscent, thick, membranaceous. Seeds oblong-conical, the raphe filiform, inconspicuous; embryo thick, conical, with an elongated cotyledon and short radicle.

Natives of western North America, Mexico and equatorial South America. One species only is known.

1. LILÆA SUBULATA, Humb. et Bonpl. Pl. Æq. i. 222, tab. 63 (1808).

Heterostylus graminens, Hook. Fl. Bor. Am. ii. 171 (1840).

The leaves of this species are not, as described even by so careful an observer as Micheli, "grass-like," but as Mr. S. B. Parish, of San Bernardino, Cal., writes, cylindrical, about the size of a goose quill and filled with spongy cellulose matter which causes them to become flat under pressure, and hence very deceptive in herbarium specimens. They are numerous, 8 to 12 inches high, erect, tapering to a point at the apex. Scapes 4 to 8 inches high, much shorter than the leaves and like them terete. The curious basilar flowers produce an enormously long filiform style, nearly as long as the scapes, sometimes even 8 inches, and tipped with a capitate stigma. They remind me very much of the similar flowers and styles of *Scirpus supinus* var. *Hallii* which I once found growing at Winter Pond, Winchester, Mass. Their fruit is many-ribbed, about 3 lines in length. The flowers of the spikes are smaller in size, those of the staminate flowers having abortive fertile flowers mixed with them. Micheli quotes Hieronymus as saying that the spikes are androgynous, having fertile flowers at the base, perfect in the centre and sterile at the apex, but none of our North American plants show this so far as I have seen, nor does Bonpland, in his original description, seem to have noticed such an arrangement. Ovaries in the upper flowers with a short, thick style, crowned by a papillose stigma.

In shallow water or mud. The plant was originally collected by Humboldt and Bonpland near Bogota in the United States of Colombia, but it has since been found in many other parts of South America. The writer gathered it at Buenos Aires. It occurs on Vancouver's Island (Macoun.), in San Bernardino county, Cal. (Parish), and Chihuahua, Mexico (Pringle). (Plate XXIV.)

4. POTAMOGETON, L. Sp. Pl. 126 (1753).

Leaves alternate or the uppermost opposite, often of two kinds, submerged and floating, the submerged linear and grass-like, the floating coriaceous, lanceolate, elliptical, ovate or oval. Spathes stipular, often ligulate, free or connate with the base of the leaf or the petiole, enclosing the young buds and usually soon perishing after expanding. Peduncles axillary, usually emersed. Flowers small, spicate, greenish or rufescent. Perianth segments 4, shortly unguiculate, concave, valvate in aestivation. Stamens of 4 sessile anthers, inserted on the claws of the sepals. Ovaries 4, sessile, distinct, 1-celled, 1-ovuled, attenuated into a short, erect or recurved style, or with a sessile stigma. Fruit of 4 ovoid or subglobose drupelets, the pericarp usually thin and hard or spongy. Seeds crustaceous, exalbuminous, campylotropous, with an uncinate embryo the radicular end of which is thickened. Very frequently amphibious forms of many of the floating-leaved species occur, which it is difficult to distinguish. These are dwarf, stocky forms, generally without submerged leaves, nearly always without fruit, and caused by the drying up of the water in which they grow. About the only method of deciding the species in such cases is by the occurrence of the normal form in the adjoining waters, and by the coriaceous leaves and stipules which usually retain their normal character. *P. pulcher*, *P. lonchites*, *P. heterophyllus* and *P. spathulæformis* (in England) are greatly addicted to this habit.

By *nutlet* in the following descriptions is meant the crustaceous seed freed from the pericarp.

About 65 fairly well-defined species occur in the cool waters of the temperate zones in all the continents, and the great bulk of them in northern North America, Europe and Asia. Of the 37 North American species, 14, so far as known, are confined to this country.

Stipules axillary and free from the leaf.
With floating and submerged leaves.
Submerged leaves bladeless.
Nutlets deeply pitted. 1. *P. natans.*
Nutlets not pitted. 2. *P. Oakesianus.*
Submerged leaves with a proper blade.
Submerged leaves of 2 kinds, lanceolate and oval or oblong.
Uppermost broadly oval or elliptical, lowest lanceolate.
3. P. *amplifolius.*
Uppermost lanceolate and pellucid, lowest oblong and opaque.
4. *P. pulcher.*
Submerged leaves all alike, capillary or linear-sectaceous.
1-nerved or nerveless. 27. *P. Vaseyi.*
3-nerved. 28. *P. lateralis.*
Submerged leaves all alike, linear.
Nearly the same breadth throughout, obtusely pointed, coarsely cellular-reticulated in the middle. 5. *P. Nuttallii.*
Broader at base, acute, without cellular-reticulation.
10. *P. heterophyllus.*
Submerged leaves all alike, lanceolate.
Fruit strongly embossed or dentate on the keels. 9. *P. Mexicanus.*

Keels of fruit even.
Uppermost leaves petioled, lowest sessile. 6. *alpinus.*
All petioled.
Floating leaves large, broadly elliptical, rounded or subcordate at base.
12. *P. Illinoensis.*
Floating leaves narrowly elliptical, sloping at base.
7. *P. lonchites.*
Floating leaves mostly obovate or oblanceolate, sloping at base.
8. *P. Faxoni.*
All sessile or subsessile.
Fruit only 1 line long, obscurely 3-keeled. 11. *P. spathulæformis.*

Fruit 1½ lines long, distinctly 3-keeled. 13. *P. angustifolius.*
With submerged leaves only.
Without propagating buds or glands.
Leaves with broad blades, mostly lanceolate or ovate, many nerved.
Leaves subsessile or shortly petioled, mostly acute or cuspidate.
14. *P. lucens.*
Leaves semi-amplexicaul, obtuse and cucullate at the apex.
15. *P. prælongus.*
Leaves meeting around the stem, very obtuse at the apex, not cucullate.
16. *P. perfoliatus.*
Leaves with narrow blades, linear or oblong-linear, several nerved.

Leaves oblong-linear, 5–7 nerved, obtuse at the apex.
17. *P. Mysticus.*

Leaves narrowly linear, 3-nerved, acute at the apex.
23. *P. foliosus.*
Leaves with narrow blades, capillary or setaceous, 1-nerved or nerveless.
Peduncles terminal, very long. 18. *P. confervoides.*
Peduncles axillary, short. 19. *P. Curtissii.*
With propagating buds or glands, or both.
With buds but without glands.
Leaves serrulate, 3–7-nerved. 20. *P. crispus.*
Leaves entire, with 3 principal and many fine nerves.
21. *P. zosteræfolius.*
Commonly with glands, but no buds.
Stems long branching from the base, leaves lax, plane, 3-nerved, abruptly acute or cuspidate. 22. *P. Hillii.*
Stems simple, leaves strict, revolute, 3–5-nerved, acuminate.
26. *P. rutilus.*
With both buds and glands.
Glands large and translucent, buds rare. 24. *P. obtusifolius.*
Glands small, often dull, buds common.
Leaves linear, 5–7-nerved. 25. *P. major.*
Leaves linear, 3-nerved. 29. *P. pusillus.*
Leaves capillary, 1-nerved or nerveless. 30. *P. gemmiparus.*
Stipules adnate to the leaves or petioles.
With floating and submerged leaves.
Submerged peduncles as long as the spikes, clavate, often recurved.
31. *P. diversifolius.*
Submerged peduncles none, or at most hardly a line long.
32. *P. Spirillus.*
With submerged leaves only.
Stigma broad and sessile. 33. *P. filiformis.*
Style apparent, stigma capitate.
Fruit without keels or obscurely keeled.
Leaves capillary, 1-nerved or nerveless. 34. *P. pectinatus.*
Leaves linear, 3–5-nerved. 35. *P. latifolius.*
Fruit strongly 3-keeled.
Leaves entire, 3–5-nerved. 36. *P. interruptus.*
Leaves minutely serrulate, finely many-nerved. 37. *P. Robbinsii.*

1. POTAMOGETON NATANS, L. Sp. Pl. 126 (1753).

The stems of this species grow from two to four feet in height, usually in still waters with a muddy bottom, and are simple or sparingly branched. Floating leaves thick, coriaceous, the blade ovate, oval or elliptical, 2–4 inches long and 1–2 inches broad, usually tipped with a short, abrupt point, rounded or sub-cordate at base, and with 20–30 rather strong nerves. The submerged leaves by which this species can always be distinguished from every other except *P. Oakesianus*, are phyllodia, without the

slightest sign of a lamina. I notice that they generally form a coriaceous blade at their tips when they reach the surface, showing that they are true petioles. Being attached to the lower part of the stem, they often become extremely long. I have specimens in which they are from 15 to 18 inches in length. Commonly they perish early, and are seldom seen at the fruiting period. Stipules long and acute (sometimes 4 inches), 2-keeled. Peduncles equalling the stem in thickness, and from 2 to 4 inches in length. Spikes cylindrical, sometimes upwards of 2 inches long, densely flowered and fruited. Fruit turgid, 2–2⅛ lines long and about 1¼ lines broad, scarcely keeled, narrowly obovate, slightly curved on the face; style short and facial; nutlet hard, more or less deeply pitted or impressed on the sides, with 2 grooves on the back; embryo forming an incomplete circle, the apex pointing towards the base.

The floating leaves of this species are occasionally very obtuse or acute at the apex and sloping at the base. The Atlantic coast forms generally have small coriaceous leaves, while those of Europe and our interior states are large. Very rarely floating leaves occur with as many as 40 nerves. The stipules also are sometimes obtuse and usually deciduous beneath the water. An extreme form (var. *prolixus*, Koch.), growing in deep water and strong currents, has all the parts very slender and greatly elongated. I have collected this with stems 12 feet in length, submerged leaves 21 inches long, and floating leaves lanceolate or lance-oblong and very acute.

Common in ponds and streams throughout Canada and the United States, extending into Mexico. Equally common in Europe. Occurs also in Africa and Asia. Fruits in July and August in our Northern States. (Plate XXV.)

2. Potamogeton Oakesianus, Robbins, in A. Gray, Man. ed. 5. 485 (1867).

Stems very slender, often much branched from below. Floating leaves elliptical, obtuse at the apex and rounded or slightly sub-cordate at the base, 1–2 inches long and 5–9 lines wide, with from 12 to 20 nerves and slender petioles 2–6 inches long. Submerged leaves mere capillary phyllodia, often continuing through

the flowering season. Peduncles 1–3 inches in length, commonly much thicker than the stem, mostly solitary. Spikes cylindrical, ½–1 inch long, usually not fruiting freely. Stipules hardly keeled, acute. Fruit obovate, about 1½ lines long and 1 line broad, nearly straight on the face, 3-keeled, middle keel sharp; the style apical or often sub-apical; sides of the nutlet not pitted, but sometimes slightly impressed; embryo circle incomplete, the apex pointing towards the base.

This species may readily be distinguished from *P. natans*, which it resembles, by its much smaller parts, its almost uniformly elliptical floating leaves, its delicate phyllodia, thickened peduncles, tricarinate fruit, and even-sided nutlet.

My friend, Arthur Bennett (Jour. Bot. 1890, p. 301), regards this species as the *P. Nuttallii* of Ch. and Sch. (Linnæa, ii. p. 226), which would give that name the priority, having been published in 1827. With this judgment I am unable to agree, since it appears to me that the fruit of *P. Oakesianus* does not correspond to the description or the figures given in that work. It is there said to be "oblique lenticulari-suborbicularis," but in shape it is rarely otherwise than narrowly obovate. The sides of the nutlet are said to be impressed in the middle, whereas in this species they are even. Our plant fails especially to agree with the description and figure of these authors in the embryonic curve, their seed being said to be "cochleato-convolutum, unico et paululum quod supersit anfractu," but in this case the seed is not cochleate-convolute, nor is the embryo coiled upon itself, the apex simply pointing to the base. The figure of the embryo in Linnæa as compared with the embryo of *P. Oakesianus* is quite conclusive. The fruit figured by Cham. and Schlecht. seems to me to agree so exactly with that of *P. Claytonii*, Tuck., that I have not hesitated to adopt their name for that species, as will be seen below.

The name here used was given by Dr. Robbins in honor of his old and intimate friend, William Oakes, of Ipswich, Mass.

A rather rare species, occurring in still waters, Anticosti, Canada, (Macoun), N. H. to N. J. and westward to the Adirondacks, N. Y. A doubtful form is sent from Nebraska by H. J. Webber. It is exceedingly abundant in some of the small ponds of Nantucket, where it fruits very freely. June–Aug. (Plate XXVI.)

3. POTAMOGETON AMPLIFOLIUS, Tuckerman, Am. Jour. Sci. and Arts, 2d ser. vi. 225 (1848).

Stems simple, 2-5 feet long, occasionally branching. Floating leaves thick, oval or ovate, abruptly pointed at the apex and rounded at the base, 2-4 inches long and 1 ¼-2 inches broad, 32-40 nerved, on petioles 3 to 5 inches in length. Submerged leaves large, the uppermost often elliptical or oval, 3-6 inches long and 1-2½ inches broad, having about the same number of nerves as the floating and sometimes shining; the lowest lanceolate, acute at each end, often as much as 8 inches long and 2 inches wide, with about 25 nerves. The lowest leaves frequently have the two sides of the blade closed and assume a recurved or falcate shape. All the submerged leaves are thin and pellucid, and are borne on short petioles. Stipules tapering to a long sharp point, 2-keeled, closely embracing the stem or spreading with age, sometimes 4 inches long. Peduncles thickening upwards, 2 to 8 inches long. Spikes thick, cylindrical, 1 to 2 inches long. Fruit, 2 to 2½ lines in length by 1¼ lines in breadth, with a thick, hard shell, turgid, obliquely obovate in shape, 3-keeled, the middle keel prominent; sides not impressed, face more or less angled; style, sub-apical; embryo slightly incurved. In the Western lakes and ponds the plants with the large oval or ovate submerged leaves are most common, and those with recurved leaves rare, while the reverse is the case in Eastern waters. Aberrant forms occur with petioles very slender and 10 or more inches in length. I have also collected occasional specimens which have at the lowest part of the stem small, opaque, oblong, long-petioled leaves similar to those found on *P. pulcher;* and, also, a very rare form which resembles *P. natans* in its upper foliage and in fruit, except the embryo. Canada from Ontario to Vancouver's Island (Macoun). United States from New England to Kentucky, and westward to Minnesota and Nebraska. An endemic species. July to Sept. (Plate XXVII, showing below one of the curved submerged leaves.)

4. POTAMOGETON PULCHER, Tuckerm. Am. Jour. Sci. and Arts, 1st ser. xlv. 38 (1843).

Stems simple, terete, black-spotted, from 1 to 2 feet high. Floating leaves usually massed at the top on short, lateral branches,

alternate, ovate or roundish-ovate, sometimes large oval or nearly orbicular, subcordate, 2–4½ inches long and 9 lines to 3¼ inches broad, 25–33-nerved. Petioles about as thick as the stem, 2–4 inches long, and spotted like that. Submerged leaves of 2 kinds, the uppermost pellucid, lanceolate, long-acuminate, undulate, 3–8 inches in length, 6–18 lines in width, tapering at the base into a short petiole, 10 to 20 nerved, irregularly cellular-reticulated for a narrow space on each side of the midrib; the lowest near the base of the stem, fewer, much thicker, opaque, spatulate, oblong or ovate, with a rounded, tapering base, on petioles which are often broadened and ½ to 4 inches in length. The submerged leaves are usually much decayed at the time of flower and fruit, and, in order to get them in good condition, they must be gathered before the flowering period. Stipules obtuse or long-acuminate, bicarinate. Peduncles slightly thicker than the stems, 2 to 4 inches long. Spikes about an inch in length and densely fruited, when fruiting at all. Fruit tapering at top into a stout apical style, 2 lines or a little more in length and 1½ lines in breadth, thick and turgid, the back sharply 3-keeled, middle keel prominent, largely rounded at base; face angled near the centre, with a sinus below; embryo coiled 1⅓ times. Aberrant forms with coriaceous submerged leaves, and the floating ones with slender petioles, 10 or more inches long, are found in mill ponds where the water has been drained off and the pond refilled. It occurs sometimes, also, in very deep water, when the upper part lengthens into slender simple or long, branching stems, very different in appearance from the shallow water forms. It may also be found quite often in an amphibious state in pools which have become nearly dry, when it is almost without stem and exhibits coriaceous leaves only.

An endemic species, rare, and still more rarely found in fruit. The most abundant locality in which I have observed it is on the island of Nantucket, where it nearly fills some of the small ponds, and fruits quite freely.

Ponds, in Wells, Me. (Harvey), Brattleboro, Vt. (Frost), Eastern Massachusetts to Pennsylvania, Georgia, and near St. Louis, Mo. (Engelmann). June, July (Plate XXVIII).

5. POTAMOGETON NUTTALLII, Ch. and Sch. Linnæa, ii. 226, t. vi. f. 25 (1827).

P. Pennsylvanicus, Ch. and Sch. Linn. ii. 227 (1827).

P. pumilus, Wolfg. in R. and S. Mant. iii. 354 (1827), fide. Ar. Benn. Jour. Bot. xxix. 307.

P. Claytonii, Tuckerm. Am. Jour. Sci. and Arts, 1st, ser. xlv. 38 (1843).

Stems slender, compressed, mostly simple, generally from 1 to 3 feet high, but sometimes 6 feet according to the depth of the water in which it grows. Floating leaves elliptical, sometimes obovate, obtuse at the apex, sloping at the base into a short petiole, 1½–3½ inches long and 4–12 lines wide, 12–27 nerved. These leaves sometimes number as many as 4 or 5 pairs at several inches distance from each other on the upper part of the stem. Submerged leaves linear, 2-ranked, 2–7 inches in length and 1–3 lines in width, 5-nerved, the 2 outer lateral nerves nearly marginal, the space between the two inner and the midrib evenly and coarsely cellular reticulated. In young plants the submerged leaves are often crowded close together, the internodes afterwards elongating. Stipules obtuse, hyaline, nerved, keelless. Peduncles about the thickness of the stem, 1–5 inches long. Spikes ½–1 inch long, fruiting freely. Fruit roundish-obovate, 1¼–1¾ lines long by 1–1½ lines broad, 3-keeled, middle keel sharp, the sides flat and distinctly impressed; style short, apical. Embryo coiled 1⅓ times.

Abnormal forms occur with stems bearing many short lateral branches, and with branched peduncles.

As has been stated under No. 2, I regard this species as conforming so closely to the figures and description of the fruit of *P. Nuttallii*, as given by Cham. and Sch., that I cannot question their identity. Otherwise I should have adopted their name *P. Pennsylvanicus*, given a little later in Linnæa, of which only the foliage is described. The truth seems to be that only fruit was seen in the one case and only foliage in the other, and these authors described them under different names.

So far as known, this species is peculiar to this country.

Common in ponds and streams throughout Canada, and from New England to Pennsylvania and South Carolina, and westward

to Oregon. (Plate XXIX., showing submerged leaves on the right.)

6. POTAMOGETON ALPINUS, Balbis, Misc. Bot. p. 13 (1804).
P. rufescens, Schrad. ap. Cham. Ad. Fl. Ber. p. 5 (1815).

As an illustration of the confusing extent to which synonymy has been carried in this family of plants, Mr. Bennett enumerates (Jour. Bot. xxvii., 242) 21 names given to this species by different authors.

Entire plant of a ruddy tinge, especially the leaves and spikes. This is very apparent in clear water. Stems simple or sparsely branched, somewhat compressed; internodes usually very long. Floating leaves coriaceous, spatulate or oblanceolate, obtuse, sloping into petioles 1–5 inches long, 17–21 nerved, mostly opposite, the midrib with a chain-like areolation on each side. Submerged leaves thin, semi-pellucid, the lowest sessile, the uppermost petioled, opposite under the branches and peduncles, oblong-linear or linear-lanceolate, obtuse or rarely acute, narrowing at base, 3–12 inches long and 2–9 lines wide, 7–17 nerved. Stipules broad, faintly bicarinate, with many fine nerves, pellucid on the edges, obtuse or very rarely acute. Peduncles about the thickness of the stem, 2–8 lines long, sometimes 3 or 4 or even more near the summit of the stem. Spikes cylindrical, 1–1½ inches in length, densely fruited, occasionally appearing compound. Fruit obovate, lenticular, smooth, reddish in color, about 1¼ lines long by 1 line wide, 3-keeled, middle keel sharp, almost winged, sloping on each side into obscure lateral keels; face arched and beaked by a short recurved style; apex of the embryo pointing directly to the basal end. It is stated by Dr. Robbins in Gray's Man. Ed. 5, that the fruit is "pitted when immature." In mature fruit no pit is seen. The nutlet shows smooth even sides, with a shallow depression near the base of the facial edge, and two obscure furrows on the back. This species, though common in Europe, while widely diffused is rare in our country.

Greenland; Canada from Nova Scotia to Vancouver's Island (Macoun); near Fort Yukon, Alaska (Kennicot); St. John's River, Maine (Pringle); Barnet, Vt. (Dr. Blanchard); Brattleboro, Vt. (Frost); Lake Champlain, on the Vermont and New York sides (Faxon, Morong); State line, Western Massachusetts (Robbins);

Niagara Falls, N. Y. (Morong); Delaware River, Belvidere, N. J. (Britton); Beaver River, Mich. (Hill); Vermilion Lake, Minn. (L. H. Bailey); National Park (Clifford Richardson); Utah (M. E. Jones); Oregon (Howell). Attributed by Brewer and Watson in Bot. Cal. to Montana, Colorado and California. July, August. (Plate XXX.)

7. POTAMOGETON LONCHITES, Tuckerm. Am. Jour. Sci. and Arts, 2d ser. vi. 226 (1848).

P. fluitans. Tuckerm. Am. Jour. Sci. and Arts, 2d ser. vii. 348 (1849), not Roth?

P. fluitans, Roth, Fl. Germ. i. p. 72 (1788)?

P. Americanus, Ch. and Sch. Linnæa, ii. 226, t. vi. f. 25 (1827)?

Stem slender, terete, much branched, elongated, 3 to 6 feet and sometimes more in length. Floating leaves coriaceous, usually rather thin, elliptical, pointed at both ends, 2 to 4 inches long and 6 to 14 lines wide, 17 to 24 nerved, on petioles 2 to 8 inches in length. Submerged leaves very thin and pellucid, often with an irregular cellular-reticulated space on each side of the midrib, 4 to 13 inches long by 2 to 12 lines wide, rather rounded at base or tapering gradually into a petiole 1 to 4 inches long. The stipules vary much in different plants, usually 3 or 4 inches long, but often only 1 or 2 inches long, acuminate, acute or obtuse, strongly or faintly bicarinate. Peduncles thickening upwards, 2 to 3 inches long. Spikes cylindrical, 1 to 2 inches long, densely fruited. Fruit 1¾ to 2 lines long, by 1 to 1½ lines wide, obliquely obovate, face nearly straight or rarely slightly angled or rounded, back 3-keeled, middle keel prominent, strongly rounded or often with a projecting wing just under the curve of the style, not impressed on the sides; style short, facial; embryo slightly incurved, the apex pointing slightly inside of the base.

Var. NOVÆBORACENSIS, n. var.

With larger and thicker floating leaves, the blades 3 to 5½ inches long by 1¾ inches wide, 20 to 24 nerved, abruptly pointed or rarely obtuse at the apex and rounded or sloping at the base. Peduncles sometimes 4 or 5 inches long and the spikes 3 inches. The submerged leaves and fruit like those of the type. This form occurs in Lake Erie, Lake Cayuga, Niagara river, Oneida Lake, Lake Seneca, the Erie Canal near it, and in stagnant pools empty-

ing into the same lake, New York. It is the plant described by Tuckerman in Am. Jour. Sci. and Arts, l. c., under the name of "*P. fluitans*, Roth."

I have hesitated much in regard to the naming of this species, but in the present confused state of opinion concerning the status of *P. fluitans*, Roth, I can see no other method of disposing of it except to retain Tuckerman's name *lonchites* as the type and to regard the New York form as a variety. I have a large set of the English plants from Mr. Fryer, named by him "*P. fluitans*, Roth," and our typical form agrees very well with these, but as Mr. Fryer states that the English plant is never known to fruit, and he has reason to regard it as a hybrid, we cannot accept it as our *lonchites*, for that is most certainly not a hybrid, as it fruits abundantly and occurs in widely separated localities, and often where neither of the supposed parents are found. I have also numerous specimens of the continental plant called by many authors *P. fluitans*, Roth. Our variety *Novæboracensis* corresponds very closely to specimens sent me by Dr. Tiselius, collected in the river Neckar, the fruit being almost identical with that of our species, and if I could be sure that his plant is the true *fluitans*, my hesitation would be at an end, but that is in dispute. The late Prof. Caspary favored me with beautiful specimens collected in Russia, identical with those of Dr. Tiselius, and labelled "*P. fluitans*, Roth," showing the opinion of this celebrated botanist. To throw doubt upon the determination, however, there come from France plants bearing the same kind of foliage as these, but with a totally dissimilar fruit, and still called "*P. fluitans*, Roth." Considering the fact that Roth only describes the foliage of his plant, apparently never having seen the fruit, that no authentic species of his naming has ever been discovered, and that various European authors differ so widely, there is no other course left but the one here adopted. Of one thing I am certain, the plants from Dr. Tiselius and Prof. Caspary are our New York species, and that is but a larger form of our *lonchites*. I have little doubt, also, that the species the fruit of which is figured and described by Cham. and Schlecht. under the name of *P. Americanus* is our plant.

Widely diffused in this country. New Brunswick and Ontario (Macoun). New England to Florida and Texas and westward to

Washington and California. Also Mexico and Cuba. July October. (Plate XXXI., showing a submerged leaf on the right.)

8. POTAMOGETON FAXONI, Morong. n. sp.

A plant collected by Mr. Edwin Faxon in the years 1880 and 1882 in Lake Champlain at Ferrisburg, Vt., which has been referred to *P. rufescens*, but is evidently quite a different species. Mr. Arthur Bennett, to whom I sent specimens, suggests in Jour. Bot. xxviii, 301, that it may be a hybrid between *P. rufescens* and *P. Nuttallii* (*Claytonii*), and also states that it greatly resembles his *P. Griffithii*, but cannot with certainty be classed under that species. If it is to be regarded as a hybrid, which may be the case, I should much rather consider it the offspring of *P. lonchites* and *P. rufescens*, as both of those species abound in the vicinity, and on the whole it more nearly resembles the former than any other North American species.

Floating leaves numerous, thick, coriaceous, mostly obovate or oblanceolate, bluntly pointed or obtuse at the apex and sloping into the petiole at base, many of them obovate like those of *rufescens*, and often strikingly like those of *spathulæformis*, 2–3½ inches long and 8–12 lines wide, 13–17 nerved, on petioles 2 to 6 inches in length. Submerged leaves oblong-lanceolate, acute or sometimes obtuse, 3–5 inches long and 6–12 lines wide, 5–13 nerved, often with an irregular areolation on each side of the midrib; on petioles ½–2 inches in length. The nerves run into the apices of the leaves, and the numerous cross veins slope slightly upward at a large angle from the midrib. Peduncles a little thicker than the stem, 2 to 5 inches long. Spikes 1 to 2 inches long, densely flowered. No fruit found.

The plant occurs in the still waters of the lake and also in the rapids of creeks emptying into the lake.

It is named in honor of Mr. Edwin Faxon, of Jamaica Plain, Mass., who was the first to collect it. (Plate XXXII).

9. POTAMOGETON MEXICANUS, Ar. Bennett, Jour. Bot. xxv. 289 (1887).

I have seen only the fruit of this species. The following is Mr. Bennett's description of the stem and foliage: "Rootstock creeping; stems simple. Lower leaves 3–5 inches long, alternate strap-shaped, elliptical, tapering at either end; petioles 3–5 inches long.

Upper leaves 3-4 inches long, alternate (or occasionally opposite), elliptical, coriaceous, with 14-16 principal ribs, and occasionally secondary ones which fall short of the apex and anastomose with the cross-veins; areolation distinct over the whole leaf; petioles 2–6 inches long. Peduncles 2 inches long, slightly thickening upwards. Fruiting spikes 1–1 ½ inches long, rather few flowered."

The fruit of this species is very distinct. Drupe 2 lines long, 1 ½ lines wide, strongly tricarinate, the middle keel prominent, sharp and denticulate, while the lateral keels are strikingly embossed with protuberances; face slightly curved; style stout, short, facial.

Named and described from specimens in the Herbarium of the British Museum collected by Schmitz in the valley of Myrica, Mexico, and at Berlin collected by Schaffner, Aug., 1854, in a river near Chasseltepec, Mexico. (Plate XXXIII. The figure of the plant is from a drawing of Mr. Bennett.)

10. POTAMOGETON HETEROPHYLLUS, Schreb. Spicileg. Fl. Lips. 21 (1771).

P. gramineus, Fries, Nov. Ed. 2, p. 36 (1828), not L.

P. gramineus, var. *heterophyllus*, Fries, Nov. Ed. 2, p. 35 (1828).

A very variable species. Stems slender, compressed, much-branched, from 1 to 2 feet high, usually growing in quiet water. Floating leaves coriaceous, oval or elliptical, short-pointed at the apex and rounded or sloping at the base, occasionally sub-cordate, 8 lines to 1 ½ inches long and 4–6 lines wide, with 10–18 nerves; petioles 1–4 inches in length. Submerged leaves pellucid, sessile, lanceolate or linear-lanceolate, acuminate or cuspidate, those of the type rather stiff, 1–3 inches long and 1–6 lines wide, with 3–7 nerves, the uppermost often petiolate. Peduncles often thickened upwards, 1–4, rarely 7, inches in length, often clustered at the top of the stem. Stipules loose, spreading, obtuse, 2-keeled, 8–12 lines long. Spike ¾–1 ¼ inches long, usually fruiting freely. Fruit roundish or obliquely obovate, ¾–1 ½ lines long by ¾–1 line broad, slightly curved or angled on the ventral side, rounded and indistinctly 3-keeled on the back, the obovate forms with an inward basal curve on the face and an indentation running into it from the centre of the sides; style short, obtuse, apical, rarely

facial; apex of the embryo nearly touching the base, pointing slightly inside of it.

The many forms of this species may be named as follows:

Forma GRAMINIFOLIUS (Fries), Morong.

var. *graminifolius*, Fries. Novit. 36 (1828).

This varies from the type in having delicate, flaccid, linear submerged leaves from 2 to 5 inches long and 1–3 lines wide. It is often found with the type and gradually runs into it.

Forma LONGIPEDUNCULATUS (Merat), Morong.

P. longipedunculatus, Merat, Fl. Paris.

This I had named forma *elongatus* until informed by Mr. Bennett that it occurs in the work of Merat under the present name. It has submerged leaves 1–2 inches long and 2–3 lines wide, sharp-pointed, the internodes naked and extremely long, frequently as much as 10 inches. Peduncles 3–6 inches long. Floating leaves ovate.

I collected this in deep water in Lake Erie, near Buffalo, and Lake Seneca, N. Y. Prof. L. H. Bailey has since obtained it in Vermilion Lake, Minn., and Mr. F. V. Coville in Chenango River, N. Y.

Forma MYRIOPHYLLUS (Robbins), Morong.

Var.? *myriophyllus*, Robbins, in A. Gray, Man. Ed. 5, p. 487 (1867).

An interesting form with long running rootstocks which send up dichotomously branching and very leafy stems. Submerged leaves delicate, about 1 inch long by 2 lines wide, 3–5 nerved, linear or the upper ones oblanceolate. Floating leaves elliptical or lance-oblong. This form often throws up very long, naked, thread like stems, which bear long-petioled floating leaves, while the submerged leaves are on short lateral branches near the base. These and the "early perishing submerged stem leaves" of which Robbins speaks are found only in a mill pond at Apponaug, R. I., the locality in which the form was first discovered, and are caused by the frequent variation in the depth of the water, now drained off and now suffered to rise. When the pond is low, the plants spring up and bear floating coriaceous leaves which are suddenly submerged by a rise in the water and very soon perish. The plant in order to meet the new conditions throws up proliferous stems which produce a new set of floating leaves.

This form is also remarkable for its tuberous rootstocks, which are very abundant.

I have collected this not only in Apponaug pond, but also in Waushakum pond, Ashland, Mass., and Lake Quinsigamond, Worcester, Mass. It occurs also in Lake Saltonstall, near New Haven, Conn. (Prof. O. D. Allen.)

Forma MINIMUS, Morong.

A very rare form, with long, almost capillary stems and internodes 3 to 4 inches in length. Submerged leaves thickly clustered on short, lateral branches, ½ to 1 inch long and scarcely ¼ line wide, acuminate, 1-nerved, some of them with the nerve obscured. Floating leaves ½ to 1 ½ inches long and 3 to 9 lines wide, lanceolate, oval or ovate, usually clustered at the summit of the stem.

This form I collected in Spot Pond, Stoneham, Mass., and it has also been detected in Lake Winnepesaukee, N. H., by W. F. Flint. The minute submerged leaves, clustered on short, lateral branches are quite striking.

Forma MAXIMUS Morong.

Var. *maximus*, Morong, without description, Bull. Torr. Bot. Club, xiii. 155.

All the parts greatly elongated. Stems sometimes 10 to 12 feet in length. Floating leaves often lanceolate and sharply pointed, 3 to 4 inches long and 6 to 14 lines wide. Submerged leaves 2 to 6½ inches long and 3 to 8 lines wide, 5 to 9 nerved. Specimens collected by Prof. O. D. Allen, in Lake Whitney, Conn., have large, oval, floating leaves with from 29 to 31 nerves, and submerged leaves with 13 nerves. Peduncles 2 to 4 inches long, usually much thickened upwards, often at right angles to the stem, a peculiarity which I have observed in specimens from other localities also. This form greatly resembles one sent by Dr. Tiselius from Sweden, and named by him var. *fluctuans*. It commonly occurs in swiftly flowing water, to which fact the elongation of the parts is doubtless largely owing.

Charles river, Mass., Saranac river, Adirondacks, N. Y., and Connecticut river, Deerfield, Mass. (Morong); Lake Vermilion, Minn. (L. H. Bailey); Pine Plains, N. Y. (Hoysradt); Delaware river, N. J. (Porter); flowing water, Busic river, Anticosti (Macoun).

Besides the localities of peculiar forms mentioned above, the range of the species is indicated by the following stations. Common throughout Canada from the Atlantic to the Pacific and from Maine and Vermont through New Jersey to North Carolina; Lake Huron (Macoun.); Sault Ste. Marie, Mich. (Morong); Chicago, Ill. (Babcock); Armstrong's Grove, Iowa (Cratty); Sherburne Geyser Basin, National Park (Clifford Richardson); Falcon Valley, Washington (Suksdorf); Salt Lake City, Utah (M. E. Jones); Ruby Lake, Nevada (Watson). Attributed by Brewer and Watson, Bot. Cal., to Soda Spring, near Mono Pass, Cal. (Plate XXXIV., submerged leaves on the left.)

11. POTAMOGETON SPATHULÆFORMIS (Robbins) Morong.

P. gramineus, var. (?)*spathulæformis*, Robbins in A. Gray, Man. Ed. 5, p. 487 (1867).

P. spathæformis, Tuck. in Herb.

P. varians, Morong in Herb.

Rootstock running, producing many branching stems 2–3 feet high. Floating leaves obovate, sometimes elliptical, abruptly acute at the apex and usually sloping at base, rather thin, 13–23 nerved, 1–2½ inches long and 6–13 lines wide, on slender petioles 1–4 inches in length. Submerged leaves pellucid, spatulate-oblong or linear-lanceolate, 2–4 inches long and 3–9 lines wide, 5–13 nerved, cuspidate or spinescent at the apex and sloping at base, all sessile at first, with age subsessile or even petioled. The submerged leaves are often reduced to phyllodia or forms with a very narrow blade and a long acumination at the apex and base. Peduncles often thickening upwards, 1–2 inches long. Stipules obtuse, faintly keeled, the apex slightly cucullate and splitting on pressure. Spikes large, densely flowered. Fruit like that of *heterophyllus*, about 1 line long by ¾ line broad, roundish or obliquely obovate, obscurely 3-keeled, with a curved or slightly angled face; style apical or facial; embryo with the apex nearly touching the base and pointing slightly inside of it.

This plant was discovered by Prof. E. Tuckerman as long ago as 1850 in Mystic Pond, Medford, Mass., and named *P. spathæformis* in his herbarium. Dr. Robbins obtained it afterwards from the same locality in 1856 and 1867, and published it as above cited. The present writer visited the spot several times in 1879-81 and found

it growing vigorously. No other locality for it is known in this country. It is, however, common in Cambridgeshire, England, and Mr. Fryer has kindly sent me a fine suite of specimens collected in that locality. Here it has never been observed in fruit, but it fruits, though not very freely, in England. The fruit, which is characterized from British specimens, shows a near alliance to *P. heterophyllus*, from which, however, it differs considerably in other points. Indeed, while it resembles *heterophyllus* on the one side, it exhibits a decided likeness to *P. angustifolius* on the other, and accordingly it has sometimes been ranked with the one species and sometimes with the other. Mr. Fryer, whose opinion in any matter relating to the *Potamogetons* of his district deserves great weight, is inclined to regard this species as a hybrid between *heterophyllus* and *angustifolius*, and there are strong reasons for suspecting that it may be a hybrid, such as the fact that the anthers are usually either destitute of pollen, or possess only unpotential pollen, and hence their inability to fertilize the stigmas, and the limited area of its growth. But a weighty argument against this view is the fact that neither of the supposed parents occurs in Mystic Pond, and that it should be produced in localities separated by the Atlantic ocean.

July–August. (Plate XXXV. The fruit is figured from British specimens supplied by Mr. Fryer.)

12. POTAMOGETON ILLINOENSIS, Morong, Bot. Gaz. v. 50 (1880.)

Stem from a thick running rootstock, stout, much-branched above. Floating leaves opposite, numerous, thick, coriaceous, 4¼–5½ inches long, 2–3½ inches wide, the apex with a short, blunt point, rounded or sub-cordate or sometimes sloping at base, oval or broadly elliptical, 18–27-nerved. Petioles often broad and flattened, 3–4 inches long. Submerged leaves numerous, usually lanceolate, 4–8 inches long and 1–2 inches wide, 13–19-nerved, acuminate or the uppermost acute like the floating, occasionally sessile, but for the most part sloping at the base into a short, broad, flat petiole. These leaves are of a very dark green color, with a conspicuous midrib, rarely reduced to phyllodia or to leaves with a long, phyllodia-like apex and base, expanding into a narrow blade in the middle.

Stipules 2–3 inches long, obtuse, strongly bicarinate. Peduncles usually thicker than the stem, sometimes thickening upwards, 2–4 inches in length. Spikes 1–2 inches long, fruiting freely. Fruit roundish or obovate, 1½–2 lines long and 1–1½ lines broad, dorsally 3-keeled, the middle keel sharp; straight or curved on the face; style facial, short, bluntish; apex of the embryo pointing transversely inwards.

This species is evidently allied to *lucens* in habit, and with that species, *P. angustifolius*, *P. spathulæformis* and *P. heterophyllus*, forms a very natural group, but it is clearly distinct from all of them in its vigorous growth, its abundant foliage, its ample floating and submerged leaves, and its large, strongly 3-keeled fruit.

In two or three recent publications some doubts have been thrown upon the specific status of this plant, which, considering its marked individuality, are, to say the least, rather surprising. Mr. Hill, in Bull. Chicago Ac. for 1891, p. 125, says: "* * * a doubtful species at best." It seems to me not half so doubtful as many other species of good standing that might be mentioned. In fact, its peculiarities are strikingly manifest.

In A. Gray, Man. Ed. 6, it is said to be "very near *amplifolius*," a species with which it has very few characters in common. The eminent Scandinavian Potamogetonist, Dr. Tiselius, whose authority upon Northern European species no one will question, identifies it with *P. lonchites* (sub. nom. *P. fluitans*, Roth.*), but it certainly bears little resemblance to any form of that species growing in this country. Nor does it square with any of the examples of this species sent to me from Sweden by my distinguished friend. In his article he compares the floating leaves of my species with those of autumnal shoots of *P. fluitans*, and, finding them similar, rather hastily, I think, pronounces them specifically identical, but he overlooks the fact that non-fruiting autumnal growths are nearly always abnormal. Were there no other differences, the entire dissimilarity between these two species in the stipules, submerged foliage and fruit are quite sufficient to separate them widely.

Our plant was first discovered by Mr. H. N. Patterson in the

* See Nordstedt's Botaniska Notiser for 1887, p. 253.

Mississippi river bottoms at Oquawka, Ill., and sent by him to Prof. E. Tuckerman, who in turn transmitted it to Dr. Robbins, by whom it was considered as an extraordinary floating-leaved form of *P. lucens*. It has since been found by Mr. R. I. Cratty in a small pond at Armstrong's Grove, Emmet county, Iowa. Both of these gentlemen have supplied me with numerous specimens in all stages of growth, from which it has been easy to deduce the characters. I have not seen it from any other locality, though it should be expected in all the neighboring regions. Fruits in August. (Plate XXXVI.)

13. POTAMOGETON ANGUSTIFOLIUS, Berch. and Presl, Rost. p. 19 (1821), fide A. Bennett.

P. Zizii, Roth, En. Pl. Germ. i. 531 (1827).

P. heterophyllus elongatus, M. and K. Deut. Fl. i. 845 (1823).

P. lucens, var. *heterophyllus*, Fries, Nov. Ed. 2, 34 (1828).

P. lucens var. *minor*, Nolte in Hans. Ex. No. 521, British Mus., fide A. Bennett.

Stem slender, branching. The branches rise from the stem at an acute angle, occasionally at a right angle. Floating leaves coriaceous or semi-coriaceous, rarely shining on the upper surface, elliptical, pointed or abruptly acute at the apex, sloping at base, the blade 1½ to 4 inches long and 6 to 12 lines wide, with 13 to 21 nerves; petioles commonly shorter than the blade, but sometimes attaining a length of 6 inches. Submerged leaves mostly lanceolate or oblanceolate, occasionally oblong-spatulate, thin, pellucid, acute or cuspidate, sometimes acuminate, often wavy or crispy and minutely serrulate near the apex, sessile or the uppermost shortly petioled, 2-6 inches long and 3–15 lines wide, 7–17 nerved. Stipules 6–18 lines long, sometimes very broad at the base, obtuse, 2-keeled, loose and spreading as in *P. heterophyllus*.

Peduncles mostly straight and erect, stout, thicker than the stems, sometimes thickening upwards, 2½–6 inches long. Spikes 1–2 inches long, more in the habit of fruiting in Europe than in this country. Fruit obliquely obovate, 1¼–1¾ lines long and about 1 line wide, the face usually straight, occasionally a little angled, dorsally 3-keeled in the mature dried fruit; style short, blunt, facial; cotyledonary apex nearly touching and pointing directly to the end of the radicle. The fruit strongly resembles that of *P. heterophyllus*.

This species seems to be intermediate between *P. heterophyllus* and *P. lucens*. It may generally be distinguished from the former by its larger size, by floating leaves of thinner texture and more sloping at the base, by its larger, more sharply pointed and strongly undulate submerged leaves and larger fruit. From *P. lucens* it may be distinguished by its floating leaves, which are lacking in *P. lucens*, as well as by its smaller fruit and other characteristics. It usually sends up coriaceous floating leaves late in the season. It flowers freely, but seldom fruits in the United States. It commonly occurs in rather shallow and quiet waters, but is not widely diffused.

A form collected by Prof. Macoun in Methy Lake, Lat. 57° n., Canada, and which I have not seen, is thus named and described by Mr. Bennett in Jour. Bot. for May, 1891, p. 151.

"Var. *Methycnsis*. Differs from any form of the type in America or Europe by the long, narrow middle leaves. The upper leaves are oval, semi-coriaceous, with long stipules, combining the habit of *longifolius*, Gay. and the *lucens* No. 607 of Herb. Fl. Ingricæ; fruit smaller, and the embryo more curved."

The type has been found in Canada in the Provinces of Ontario and Quebec (Macoun); Fresh Pond, Cambridge, Mass. (Morong); Wenham, Mass. (Faxon, Morong); Pine Plains, N. Y. (Hoysradt); Lake Cayuga, N. Y. (Dudley); Oneida and Seneca Lake, N. Y. (Morong); Delaware river, above Phillipsburg, N. J. (Porter); Pine Station, Ill. (Hill); Frankfort, Mich. (Hill); Lewis Lake, Wyoming (Clifford Richardson); Montana (Hayden Survey); Florida (Curtiss); Texas (Reverchon, Wright). Common in England and Continental Europe. (Plate XXXVII.)

14. Potamogeton lucens, L. Sp. Pl. 126 (1753).

Stem thick, branching below and often with masses of short leafy branches at the summit. Destitute of propagating buds or glands. Leaves all submerged, elliptical or lanceolate, uppermost often oval, rounded at both ends and merely mucronate, usually acute or acuminate and cuspidate, sessile or short petioled, 2½–8 inches long and 8–20 lines wide. The nerves are commonly 13, but sometimes fewer, and the tips frequently serrulate. They are rarely shining, though the name would imply otherwise. Stipules 1–3 inches long, obtuse, bicarinate, commonly loose and spread-

ing, sometimes very broad. Peduncles 3–6 inches long, scarcely thickening upwards. Spikes 2–2½ inches long, very thick cylindrical, fruiting freely late in the season.

Fruit about 1½ lines long and 1¼ lines broad, roundish; keels small, often obscure; face usually with a slight inward curve at the base; style nearly apical; apex of embryo pointing transversely inwards, but the curve less than in No. 12.

The typical form of our species approaches most nearly to the European form called var. *ovalifolius*, M. and K., as the uppermost leaves are generally oval or ovate in outline. Those remarkable forms, so common in Europe, and known as var. *cornutus*, Presl., var. *longifolius*, Gay, and var. *acuminatus*, *Schum.* never occur in our country, so far as I am aware, but they are approached by the submerged foliage of *P. Illinoensis*.*

Var. Connecticutensis, Robbins, in A, Gray, Man. Ed. 5. 488 (1867.)

This seems to be a good variety, but very rare. As stated by Dr. Robbins, the stems are flexuous, the leaves acuminate, and the fruit larger than in the type (1¾–2 lines long and about 1½ lines wide), distinctly tricarinate and with a facial style. It has been found only in Saltonstall's Pond, East Haven, Conn. (Robbins), and Pine Plains, N. Y. (Hoysradt). Forms resembling this were obtained by E. Faxon in Lake Dunmore, Vermont, but without fruit.

The typical *lucens* is not very common in this country. It occurs rarely in Nova Scotia and Ontario (Macoun); Fresh Pond, Cambridge, Mass. (Morong); Lakes Cayuga, Onondaga and Oneida, N. Y. (Dudley, Morong.); Pine Station, Indiana (Hill). Attributed to Fla. by Chapman (Chap. Fl.); and to Mission Dolores, Cal. by Brewer and Watson (Fl. Cal). It has also been collected by Pringle in the State of Michoacan, Mex. (No. 3327, wrongly named *P. Zizii*). Cuba (Wright). Common throughout Europe, Asiatic Russia, and other parts of Asia. (Plate XXXVIII.)

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*Mr. A. Bennett in his recently published list of the *Potamogetons* in the Vienna Herbarium (Ann. der. K. K. Naturhist. Hoffmus. for 1892, p. 290), notes in that collection a specimen of *P. longifolius*, Gay, gathered in Oregon by Dr. Lyall.

15. POTAMOGETON PRAELONGUS, Wulf. in Röm. Arch. iii. 331 (1805).

P. flexuosus, Schleich. and Wredow, Meklenb. Fl. (1807).

P. flexicaulis, Dethard, in Strelitz. Anz. 1809. n. 50.

Stem white, flexuous, flattened, much branched, growing in deep water, sometimes 6 to 8 feet in length. Leaves all submerged, oblong or oblong-lanceolate, obtuse and cucullate at the apex, splitting on pressure, semi-amplexicaul, of a bright green color. They are from 2 to 12 inches in length, and from ½ to 1¼ inches wide, with only 3 or 5 main and from 7 to 17 finer nerves, sometimes with a narrow reticulated space on each side of the midrib. Stipules white, scarious, obtuse and commonly closely embracing the stem. Abnormal specimens with spreading stipules 2–3 inches long have been collected in Maine by Miss Kate Furbish. Peduncles from 3 to 15 inches and occasionally as much as 20 inches long, erect, straight, about as thick as the stem, and often very numerous. Spikes 1–2 inches long, thick, cylindrical, densely fruiting. Fruit dark green, obliquely obovate, 2–2½ lines long and 1½–2 lines wide; the back much rounded, often with the upper curve nearly as high as the style. Middle keel sharp and prominent, sloping on the sides to rather obscure lateral keels; face straight or nearly so; style short, obtuse, facial; apex of embryo pointing directly to the base.

This species fruits in our country in June and July, and usually withdraws its stems beneath the water as soon as the fruit is set. Hence the difficulty of obtaining good fruit unless dredging is resorted to.

Deep water, lakes and ponds, Nova Scotia, New Brunswick, Ontario and Vancouver's Island (Macoun's Cat.); Shelburne Pond Vt. (Pringle); Wenham and Fresh Ponds, Mass. (Morong); Bantam Lake, Litchfield, Conn. (Morong); Lake Salstontall, Conn. (Prof. J. A. Allen); Canaan, Conn. (Robbins); Budd's Lake, N. J. (Porter); Lake Canandaigua, N. Y. (Morong); Maltowah Lake and Chenango River, N. Y. (Coville); Frankfort, Mich. (Hill); along the Great Lakes to Lake Superior (Robbins); Vermilion Lake, Minn. (L. H. Bailey); Iowa (Arthur's Cat.); National Park (Clifford Richardson); Sierra Co., Cal. (Brew. and Wats. Bot. Cal.). (Plate XXXIX.)

16. POTAMOGETON PERFOLIATUS, L. Sp. Pl. 126 (1753).

Stems slender, from running rootstocks which throw up many shoots, much branched, often with many short lateral branches along the main stem. Leaves very variable in shape and size, mostly ovate or rounded, sometimes lanceolate, usually obtuse, sometimes acute at the apex, amplexicaul and cordate at base, meeting around the stem. They are never cucullate, as in the preceding species, and never known to produce propagating buds or glands. They are often crowded upon the stem, but more commonly separated at a considerable distance, generally alternate, but opposite under the nodes of the branches. The typical European forms have large rounded or ovate leaves about 2 inches long by 1 ½ inches broad, varying from this to narrow and elongated forms ½–1 ½ inches long and 4–15 lines in width, and 13–27-nerved. The full type is rather rare in this country, the greater part of our forms being small leaved, and west of New England running into the form known as Var. *lanceolatus*, Robbins. As found here the typical plant has leaves varying from 5 to 15 lines long and from 3 to 12 lines wide, usually obtuse and minutely serrulate near the apex. Peduncles 1 ¼ inches long, about the same thickness as the stem, usually erect or slightly spreading, running in the axils of the leaves for a long distance along the upper part of the stem. Spikes 8–12 lines long, often flowering and fruiting under water. Fruit obliquely obovate, 1 ¼–1 ½ lines long by 1 line or a little more in breadth, obscurely tricarinate on the back, the face a little curved outwardly towards the top, the sides with a shallow indentation which runs into the face; style nearly facial; embryo slightly incurved or with its apex pointing directly towards the base.

Var. RICHARDSONII, Ar. Bennett, Jour. Bot. xxvii. 25 (1889).
Var. *lanceolatus*, Robbins, in A. Gray, Man. Ed. 5, 488 (1867).

Mr. Bennett notes that the name of Robbins is preoccupied by a different form of Blytt in Norges Flora (1861), and proposes the present name in honor of the Arctic explorer, Dr. Richardson, "who seems to have been the first to point out the difference from the European forms in the 'Appendix' (Botany) to Franklin's Expedition."

Leaves of this variety lanceolate, from 1 to 4¼ inches long and 4–8 lines wide at the broadened amplexicaul base, often curving inwards towards the apex, and from 13 to 23-nerved. Leaves from North Hero, Lake Champlain (Morong), and Sault Ste. Marie, St. Mary's River, Mich. (Hill), measuring 4¼ inches in length, are the longest that I have ever seen. The fruit is somewhat larger than in the type, measuring about 1¾ lines long by 1¼ lines wide.

Forms found in Wenham Pond, Mass., greatly resemble *P. nitens*, Webber, of Europe, and are considered to be this species by Dr. Tiselius. They also bear a strong resemblance to *P. perfoliatus*, var. *Jacksoni*, Nees, of England, which is regarded as a form of *nitens* by Prof. Babington. They have oblong leaves 1–1½ inches long and 4–9 lines wide, obtuse, 7–13-nerved, not serrulate, semi-amplexicaul, with very slender, laterally much-branched stems.

Common in Canada from Nova Scotia to Ontario (Macoun). In the United States it occurs in nearly all parts of the country from Maine to Florida, and west to the Pacific. The variety occurs in Ontario, Canada, and thence westward, and from Lake Champlain, Eastern New York and Delaware westward to Oregon and California, being the most common Western form. In still, shallow or deep water. July–September. (Plate XL. Var. *Richardsonii* is figured on the right).

17. Potamogeton Mysticus, Morong, Bot. Gaz. 5, 50 (1880).

Whole plant very slender and delicate. Stems from a creeping rootstock which throws up many shoots, irregularly branching above, nearly filiform, terete, 1–3 feet high. Leaves all submerged, scattered, oblong-linear, 1–1½ inches long and 1–3 lines wide, 5–7-nerved, obtuse and rarely with minute serrulations near the apex, abruptly narrowing at the base and sessile or partly clasping. Stipules obtuse, about 6 lines long, hyaline, with many fine nerves, mostly deciduous, but sometimes persistent and closely sheathing the stem. Spikes few, capitate, 4–6-flowered, on erect peduncles from 1 to 2 inches in length. No ripe fruit has ever been found, but one or two immature drupes indicate that it is obovate, minute, scarcely ¾ of a line long by ½ a line broad, obscurely 3-keeled on the back, a little beaked by the slender recurved style.

Since I obtained this from Mystic Pond, Medford, Mass., in 1879, I have visited the locality for several years in succession, and, though I have always found the plant growing vigorously, yet it has shown no signs of prefecting fruit. In the year 1887 I found it growing in Miacomet Pond, Nantucket, under water about 3 feet deep, but it was entirely without flowers or fruit.

It is closely allied to *P. perfoliatus* in habit, with which it is associated in growth, but very unlike that in foliage, and scarcely one-third as stout in any of its parts. August–September (Plate XLI).

18. POTAMOGETON CONFERVOIDES, Reichb. Icon. Fl. Germ. et. Helv. vii. 13 (1845).

P. trichoides, A. Gray, Man. ed. 1 p. 457 (1848). Tuckerm. Am. Jour. Art and Sci. 2 ser. vii, 358 (1849), not Cham.

P. Tuckermani, Robbins in A. Gray, Man. Ed. 2. 434 (1856).

Mr. Bennett states in Jour. Bot. xxviii. 92, that he has seen a specimen of this species in Gay's Herb. at Kew under Reichenbach's name, and that it is undoubtedly the same as *P. Tuckermani*, Robb. The description of Reichenbach corresponds very well to our plant. There is here a good illustration of the danger of determining names without corroborating specimens, for Tuckerman, one of the most minute and careful observers, says in his paper upon *P. trichoides:* "I have seen no specimens of the European plant, but Chamisso's minute description, and his figure of the fruit leave little or no doubt of the identity of ours with it," and yet he was mistaken.

Stem from a creeping rootstock, slender, terete, much-branched, the upper branches repeatedly dichotomous, 6–18 inches high. Leaves very delicate, flat, setaceous, 1–2½ inches long, the broadest scarcely ¼ line wide, tapering to a long hair-like point, 1–3-nerved, often with a few cross ribs or coarse reticulations, of a bright green color, a little yellowish tinted. Stipules delicate, obtuse, 2–3 lines long. Peduncles terminal, 2–8 inches long, straight and erect, somewhat thickened upwards, sometimes with a short lateral branch bearing a spike. Spikes capitate, 3 or 4 lines long; Fruit thick with a shell roundish-obovate, 1–1½ lines long and about as wide; back sometimes a little angular or sinuate, 3-keeled, the middle keel sharp and prominent; face notched near the base; sides impressed with a shallow indentation which runs into the

notch of the face; style short, apical; embryo circle complete, the apex nearly touching the base a little inside of its end.

A rare species growing in the shallow water of ponds. Round Pond, York, Me. (Fernald); Franconia Notch, N. H. and a small pond on Mt. Willey, 3,000 feet alt. (Faxon); Uxbridge, Mass. (Robbins, Morong); New York (Torrey); common in N. J.; Great Lake, Carbon Co., Pa. (Porter). (Plate XLII.)

19. Potamogeton Curtissii, Morong, Bull. Torr. Bot. Club, xiii. 145 (1886).

Stems simple or branched, capillary, a foot or more in height, the internodes long and naked. Leaves 6–17 lines long, almost setaceous, many of them less than ¼ of a line and none ½ a line broad, tapering to a long, hair-like point, the midrib with 2 delicate nerves or a loosely-reticulated space on each side of it. Stipules hyaline, obtuse, 3 or 4 lines long, deciduous. Peduncles 3–6 lines long, somewhat clavate, erect, axillary and racemosely disposed, 5 or more of them at intervals of one or two inches along the upper part of the stem. Spikes capitate, 2 or 3 lines long, 3–6-flowered. Fruit not seen.

Collected by Mr. A. H. Curtiss in Blackwater River, and a "tidal creek" in Northwest Florida, May and June, 1886, the only known locality for it. (Plate XLIII. A magnified leaf is figured on the right.)

20. Potamogeton crispus, L. Sp. Pl. 126 (1753).

Stems branching, compressed. Leaves 2-ranked, linear-oblong or linear-oblanceolate, sloping at base, sessile or semi-amplexicaul, obtuse, serrulate, crisp, ¾–4 inches long and 3–7 lines wide, 3–7-nerved, the midrib often compound and the outer nerves very near the margin. Stipules small, scarious, obtuse, early perishing. Peduncles 1–2 lines long, frequently recurved when in fruit and sometimes very numerous. Spikes about half an inch long, and looking very bristly with the long-beaked drupes when in fruit. Fruit ovate, about 1½ lines long and 1 line or a little more in width, having 3 rounded keels on the back, the middle one with a small projecting tooth near the base, a slightly curved face, and a curved facial style nearly as long as the drupe; the shell thick and corky, containing a small embryo, the apex of which points directly towards the end of the radicle.

This species in our country propagates itself mainly by winter buds, of which there are two kinds. The rarer kind is spicular in form, being simply a fragment of the stem, shrunken or sharpened at the ends, with 2–6 buds upon it in the axils of the decayed leaves. The more common form is a thick, rigid body composed of the ends of the branches or stems, in which the upper portion is swollen, hardened and surrounded by the bases of the leaves, which are also much enlarged and indurated, and reduced to a triangular shape, several buds being left in the axils. The lower end becomes sharpened and is so easily detached that a mere jar shakes it off the stem. The whole bud looks like a burr, and when separated from the stem floats away bottom side up or sinks into the mud. The new plant is formed by the development of one of the buds which throws out roots as it grows. It occurs in fresh and brackish or tide water. Confined to a strip along the Atlantic coast from Arlington, Mass., to James City, Virginia. It also runs inland in fresh water as far as Lancaster, near the Susquehanna River, Pa. (Porter), and the Lakes Keuta and Seneca, in the centre of New York. Introduced from Europe, where it is common.* (Plate XLIV. The two kinds of propagating buds are shown on the left.)

21. POTAMOGETON ZOSTERÆFOLIUS, Schum. Enum. Pl. Saell. 50, 168 (1801).

P. complanatus, Willd. Mag. Berl. Fl. iii. 248 (1809).

P. compressus, Fries, Nov. Ed. 2. 44 (1828), not L. Herb.

P. cuspidatus, Schrad. in Smith's Eng. Bot. i. 235 (1828).

Stem very much flattened, sometimes winged, widely branching. Leaves linear, obtuse and mucronate or shortly acute, with 3 principal nerves and many fine ones, the midrib often compound, 2–12 inches long and 1–2 inches wide. Stipules scarious, obtuse, finely nerved, soon perishing. Peduncles 1½–4 inches long; spikes cylindrical, about ½ inch long, 12–15 flowered. Fruit obovate, with a broad base, 1¾–2 lines long and 1¼–1½ lines wide, 3-keeled on the back, lateral keels somewhat obscure, the

* Probably of recent introduction, as it seems not to have been known to the older botanists, Rafinesque, Michaux, Pursh, Nuttall, Barton and others who collected extensively in the region where it grows during the early part of this century.

middle one often slightly toothed or undulate and with a projection at the base; face arched, beaked with a short, recurved style; embryo slightly incurved.

The propagating buds of this species are very unlike those of No. 20, consisting only of the ordinary terminal leaf bud which drops off near the end of the branch, sinks to the bottom and rests in the mud during the winter. It is, however, a very common source of propagation.

An elegant plant, with bright smooth leaves in fascicles at the summits of the branches. It may be distinguished from other North American species, and from *Heteranthera graminea* with flowerless forms of which it is sometimes confounded, by the numerous fine nerves on the leaves.

In still or slowly moving water in Northern regions. New Brunswick to the Saskatchewan, Canada (Macoun); Vermont to New Jersey and westward to Iowa, Lake Superior and Oregon (Hall, No. 491, fide Brew. and Wats. Bot. Cal.). Common in Europe. July, August. (Plate XLV.)

22. POTAMOGETON HILLII, Morong, Bot. Gaz. vi. p. 290 (1881).

Stems slightly compressed, slender, widely branching, 1–2 feet in height. Leaves linear, acute or abruptly acute and cuspidate, often almost aristate, 1–2¼ inches long and ½–1¼ lines wide, 3-nerved, the lateral nerves delicate and nearer the margins than the midrib, the midrib below often compound. Stipules whitish, many-nerved, obtuse, 3–5 lines in length. Peduncles about half an inch long, erect or slightly recurved, more or less clavate. Spikes capitate, 3–6 fruited. Fruit obliquely obovate, obtuse at the base, 1¾–2 lines long by 1–1¼ lines broad, tricarinate on the back, the middle keel sharp and more or less undulate, flat on the sides, the face slightly arched; style nearly facial, short, recurved; embryo apex pointing transversely inwards.

There are two forms of this species, the one biglandular at the base of the leaves, and the other glandless. I found it growing in the small pot ponds of Manistee, Mich., each pond having its own form and apparently never mixing. In general appearance similar to the large forms of *P. foliosus*, but allied by its peduncles, spikes and fruit to *P. obtusifolius* and *P. zosteræfolius*, and still more

closely to the European *P. acutifolius*, Link, to which in these respects it bears a close resemblance.

A rare species growing in pools and ponds, and so far as known, peculiar to the United States. Lake Cayuga and near Freeville, N. Y. (Dudley); Pine Plains, N. Y. (Hoysradt); Manistee, Mich. (Hill, Morong); Ashtabula, Ohio (Hill). (Plate XLVI.)

23. POTAMOGETON FOLIOSUS, Raf. Med. Rep. 2d Hex. v. 354 (1808).
P. gramineus ? Mx. Fl. i. 102 (1803), not L.
P. pauciflorus, Pursh, Fl. i. 121 (1814).

Pursh's name, which this species has borne so long, must be surrendered, not only because it had been antedated by that of Rafinesque, but also because it had been used by Lamark as long ago as 1778 (Fl. Franc. iii. 209, No. 798) as a synonym of *P. densus*, L.

A variable species peculiar to North America. Stems flattened, much-branched, 1 to 3 feet high. Leaves 1–2 inches long and ½–1 line wide, acute, 3-nerved, not glandular at the base. Very delicate forms are found, especially near the Atlantic coast, which are scarcely more than 6 inches in height, the stems filiform, the leaves not over 8 lines long by ¼ line wide, the lateral nerves obscure or even obsolete. From this it rises into the coarser forms which are more common inland and towards the west. Stipules white, hyaline, obtuse, sometimes acute, 6–10 lines long. Peduncles more or less club-shaped, erect, about ½ inch long. Spikes about 4-flowered. Fruit impressed with a shallow pit on each side when young, but even when fully mature, lenticular, or nearly orbicular, ¾–1 line in diameter; 3-keeled on the back, the middle keel winged, sinuate-dentate, often with projecting shoulders or teeth at each end; face strongly angled or arched, sharp or alate, often with a sharp, projecting tooth at the base; style nearly apical, straight or recurved; embryo curve complete, the apex nearly touching the basal end. The fruit rarely approaches that of *P. pusillus*, being obliquely obovate, about 1 line long and ¾ line wide, the wing on the middle keel narrow and not dentate, but still it may always be distinguished by being more or less crested. This species is also in very rare cases furnished with reproductive buds and minute glands like those of *pusillus*.

Var. NIAGARENSIS (Tuckerman) A. Gray, Man. ed. 2. 435 (1856).
P. Niagarensis, Tuckerm. Am. Jour. Sci. 2 ser. vii. 354 (1849).

Larger than the type, stems 2–3 feet in height, leaves sometimes over 3 inches in length and 1 line wide, 3–5-nerved. Stipules longer and occasionally acute. Spikes 8–12 flowered. Mainly distinguished by its large size. This form, which is the coarsest in the species, was originally discovered by Prof. Tuckerman in the rapids above Niagara Falls, and was considered by him a good species, but it seems to me too near *foliosus* to take specific rank. For many years it seemed to have disappeared from the original locality until the writer found it in abundance in a sluice way between the Falls and the village on the American banks. It has recently been collected by Mr. F. V. Coville in the United States expedition to Death Valley, California.

Var. CALIFORNICUS, Morong, Bot. Gaz. x. 254 (1885).

This form is distinguished by its bushy, vigorous growth and large thick stem which is strongly flattened and sometimes winged, often ½ line wide. Many stems, thickly clustered, rise from the roots. Leaves not so long or broad as in the preceeding variety, but with a dilated mid-rib, reminding one of *P. obtusifolius*, and frequently 5-nerved at the base. Peduncles 4–6 lines long, erect, clavate, flattened. Spikes often ripening 12 strongly marked fruit. Collected in San Bernardino county, Cal. by the Parish Brothers, and by D. Cleveland at San Diego.

The species has a wide range, occurring in Canada from New Brunswick to British Columbia (Macoun); New England to Florida and New Mexico and westward to Oregon and California. July-September. (Plate XLVII. Two common forms of the fruit are figured.)

24. POTAMOGETON OBTUSIFOLIUS, M. and K. Deut. Fl. i. 855 (1823).
P. gramineus, Sowerby, Eng. Bot. iii. t. 2253 (1794), not L.
P. compressus, Wahl. Fl. Suec. i. p. 107 (1824), not L.

Stem usually slender, compressed, branching widely, especially towards the summit. Leaves linear, 2–3 inches long and ½–2 lines wide, obtuse, often mucronate, usually 3-nerved, sometimes 5- and rarely 7-nerved, biglandular at base, the glands large and translucent, the midrib broad and frequently compound. Stipules white or scarious, many-nerved, obtuse, 6–9 lines long, often as long as or longer than the internodes. Peduncles numerous, ½–

1 ½ inches long, slender, erect, rising from the axils of the branches. Spikes 3–4 lines long, ovate, continuous, 5–8 flowered. Fruit obliquely obovate, about 1 ½ lines long and 1 line wide, 3-keeled, middle keel distinct; face straight or nearly so; sides with a slight impression which runs into the face; style short, blunt, nearly facial; embryo with the apex pointing a little inside of the base. In North American forms the fruit is slightly longer and narrower, and the embryo more incurved than in the European plant. Rarely producing propagating buds.

Non-fruiting specimens of *P. major* are liable to be confounded with this species. For the distinctions see under that species.

Not very common in this country. Ponds and still waters. Quebec and Methy River, Lat. 57° N. Canada (Macoun); Barton, Vt. (Robbins); Granby, Mass. (Tuckerman); Pleasant Pond, Wenham, Mass. (Morong); Worcester and Natick, Mass. (Morong); Pine Plains, N. Y. (Hoysradt); Spencer, N. Y. (Dudley); Easton and Susquehanna River, Pa. (Porter); Lake Superior (Robbins); Vermilion Lake, Minn. (L. H. Bailey); Sherburne Geyer Basin, Wyoming (Clifford Richardson). July–August (Plate XLVIII.)

25. POTAMOGETON MAJOR (Fries) Morong.

P. pusillus L. var. *major*, Fries, Nov. 48 (1828).

P. Friesii, Ruprecht in Beit. Pf. de Russ. R. iv. 43 (1845).

P. compressus, Sm. Eng. Bot. iii. t. 418 (1794). Reich. Ic. Fl. Germ. vii. 15 (1845), not L.

The name *compresus*, which is used by some authors must be discarded, because it is applied by Linnæus himself to several species. *P. mucronatus*, Schrad., is also uncertain, according to Mr. Bennett, who has carefully studied the synonymy of this species. (See Journ. Bot. May, 1891, p. 150). Fries' varietal name, so far as I can see, is the earliest name applied to it on which we can depend.

Stems compressed, 2–4 feet high, branching, Leaves 1½–2½ inches long, about 1 line wide, shortly acute or obtuse and cuspidate, usually 5-nerved, but rarely 7-nerved, biglandular at base, the glands small, often dull. Intermediate forms between this and *P. pusillus* often occur in this country in which most of the leaves

are 3-nerved or 5-nerved at the base only. Stipules white, hyaline, finely nerved, obtuse or acute, 6-12 lines long. Peduncles 1–1½ inches long, often thicker than the stem and sometimes thickening upwards. Spikes when developed interrupted. Fruit quite similar to that of *P. pusillus*, but I find it always with a recurved style, generally with a shallow pit on the sides and with the apex of the embryo pointing almost directly towards the basal end. The propagating buds are similar to those of *P. pusillus*, but not so common.

This species may generally be distinguished from *pusillus* in its various forms by its larger leaves, larger and more flattened stems and its more elongated and less branching habit, but the two run together so closely that at times it is difficult to separate them. It is considered by some authors as intermediate between *P. pusillus* and *P. obtusifolius*, and when not in fruit it may be confounded with the latter, but as a rule the glands are smaller and duller in tint than in that, and the leaves shorter. *P. obtusifolius*, too, is much more bushy in habit, sometimes even spreading out in fan-shape, and it is extremely rare that its leaves have more than 3 nerves.

The species rare in the United States. New Brunswick, Ontario and British Columbia (Macoun); Lake Champlain, Vt. (Faxon); Lake Seneca, N. Y., abundant (Morong); Wisconsin (Lapham); Michigan (Hill); Minnesota (Cratty). July–September. (Plate XLIX. A leaf magnified is shown on the left.)

26. POTAMOGETON RUTILUS, Wolfg. in R. and S. Mant. iii. 362 (1827).

P. cæspitosus, Nolte, fide Reich. Ic. vii. 15.

Stems very slender, 8 to 24 inches in height, compressed; roots finely fibrous, sending up many stems, but each stem simple or nearly so. I find them occasionally rising from a bit of stem or hybernaculum, showing that the species is sometimes, at least, propagated in this way, but usually without propagating buds. Leaves 1 to 1½ inches long and ¼ to ½ a line broad, acute or acuminate, strict, nearly erect, 3–5 nerved, revolute, nerves prominent beneath, the midrib compound, especially at the base, where it often divides into 2 and even 4 strongly marked nerves, often

biglandular at base and bright green in color. Stipules acute, 6–10 lines long, often longer than the internodes and hiding the bases of the leaves above, persistent, becoming white and fibrous with age. Peduncles 6–18 lines long, scarcely thicker than the stems. Spikes 3–5 lines long, usually continuous, but sometimes interrupted. Fruit obliquely obovate, ¾–1 line long by ½–¾ line wide, keels obscure, or the back showing only 2 small grooves; face obtusely angled towards the base; apex of drupe sloping into a short, facial, recurved style; embryo circle not complete, the apex pointing a little inside of the basal end. Resembling *pusillus*, especially those occasional forms of that species which have acute and somewhat revolute leaves; but its strict, almost or quite erect leaves with long very sharp acuminate points, prominent nerves, and long, persistent, acute stipules well distinguish it.

A rare species in this country. Anticosti, at the mouth of the Nipigon River, near Red Rock, Lake Superior and James Bay, Canada (Macoun). Found by Prof. L. H. Bailey in flower July 24, 1886, in Vermilion Lake, Minn., (no. B. 394). (Plate L.)

27. POTAMOGETON VASEYI, Robbins, in A. Gray. Man. Ed. 5, 485 (1867).

Bearing floating leaves on the fertile stems only. Very delicate, stems filiform, widely branching from below and with many short lateral branches above, 1–1½ feet in height. The emersed fertile forms in shallow water, near shore, and the more common sterile submerged forms in water from 6 to 8 feet in depth. Floating leaves coriaceous, in 1–4 opposite pairs at the top of the stem, the blades obovate, 4–5 lines long by 2–3 lines wide, with 5–9 nerves deeply impressed beneath, sloping at base into petioles 3–4 lines long. Submerged leaves almost capillary, nerveless or 1-nerved, tapering to the fineness of a hair, 1–1½ inches in length. The leaves frequently biglandular at base. Stipules white, delicate, many nerved, acute or obtuse, 2–3 lines long. Peduncles 3–6 inches long, spreading or recurved, thickening in fruit. Spikes 2–3 lines long, often interrupted. Fruit roundish-obovate, about 1 line long and nearly as broad, 3-keeled, middle keel rounded; face arched above and incurved below, tipped with a rather long straight or recurved style; sides even or impressed with a shallow

pit. The spikes ripen from 2 to 6 fruit, most of the flowers being abortive. This species, especially in the submerged plant, is furnished with delicate reproductive buds which are formed at the ends of short lateral branches and by which it seems to be mainly propagated. The internodes are usually long and naked.

Var. LATIFOLIUS, Morong.

A rare form with submerged leaves 1/3–3/4 of a line wide, abruptly acute and 1–3-nerved. The glands more conspicuous than in the type. This was collected by Dr. Beardsley at Painesville, Ohio.

A rare endemic species confined to Canada and the Northern United States.

The original plant was collected by Dr. George Vasey near Ringwood, Ohio. It has since been found at Ottawa (Fletcher), and on the Great Plains, Canada (Macoun); Barnet, Vt. (Dr. Blanchard); Lake Saltonstall, Conn. (O. D. Allen); Spot Pond, Stoneham, Mass., Lake Quinsigamond, Worcester, Mass. and Greenwood Lake, N. Y. (Morong). (Plate LI.)

28. POTAMOGETOM LATERALIS, Morong, Bot. Gaz. v. 51 (1880).

Stems filiform, much-branched, internodes usually long and naked. Floating leaves coriaceous, elliptical, obtuse at the apex and sloping at base into petioles 3-10 lines long, blades 4 or 5 lines long by 1–2 lines broad, with 5–7 nerves deeply impressed beneath, usually in 1–3 opposite pairs which stand at right angles to the stem, found only on sterile shoots. Submerged leaves very narrow, linear, acute, 1–3 inches long and 1/4–1/2 line wide, 1–3-nerved, the lateral nerves very delicate and obscure, the midrib prominent and often with fine veins or cellular reticulations on each side of it, biglandular at base, but the glands few, small and often obsolete. Stipules small, hyaline, many-nerved, obtuse, deciduous. Peduncles as well as the floating leaves with a peculiar lateral appearance, widely spreading at maturity, sometimes even recurved, thickened when in fruit, 4–15 lines in length. Spikes capitate or often interrupted, 3–4-flowered. Fruit obliquely obovate, about 1 line long by 3/4 line broad, lenticular, the back much curved and 2-grooved, the face arched and surmounted by the nearly sessile stigma; embryo oval in its curve, the apex

nearly touching the point of the base. The plant is scantily furnished with reproductive buds like those of *P. pusillus*. Proliferous shoots at the summit of the stem and on the upper branches, above the floating leaves, appear late in the season just as the plants are beginning to decay, a very peculiar habit.

In slowly-moving water, 3–4 feet deep, in dense masses, Charles River, Dedham, Mass. (Faxon, Morong); Salisbury, Conn. (Robbins); Hemlock Lake, Livingstone Co. N. Y., and Bear Lake, Mich. (Hill). July, August. (Plate LII. Sterile and fertile branches.)

29. POTAMOGETON PUSILLUS, L. Sp. Pl. 127 (1753).

A variable species with filiform, branching stems from 6 inches to 2 feet in height. Leaves all submerged, linear, obtuse and mucronate or acute at the apex, 1–3-nerved, biglandular at base, rarely glandless, 1–3 inches long and ¼–¾ line broad. The typical form (var. *vulgaris*. Fries. Nov. p. 49), has leaves 3-nerved, from a little less than ½ to ¾ line broad, obtuse or shortly acute, and not unfrequently cellular-reticulate between the midrib and the lateral nerves. The leaves are sometimes revolute and slightly ridged in the middle, resembling in this respect those of *P. rutilus*. Another common form has the leaves about ¼ line wide, almost setaceous, 1–3-nerved, the lateral nerves obscure or obsolete, acute (var. *tenuissimus*, M. and K. Deut. Fl. i. 857. *P. gracilis*, Fries, Nov. p. 50).

Both of these forms are occasionally provided with reproductive buds.

Stipules short, hyaline, obtuse, when enclosing the bud boat-shaped. Peduncles vary greatly in length, generally from 3 to 9 lines long, but occasionally elongated from 1 to 3 inches, and sometimes thickened in fruit. Spikes about as often interrupted as capitate in all the forms, 3–10-flowered. Fruit obliquely elliptical, ¾–1 line long and ½–¾ line wide, curved and 2-grooved on the back, or sometimes with 3 distinct keels; face slightly arched or often with a projecting curve above and an inward curve below, beaked by a short, straight or recurved style; apex of the embryo slightly incurved and pointing obliquely downwards.

Var. PANORMITANUS (Biv). Morong.
P. Panormitanus, Biv. Sic. Pl. (1806–7).

Uppermost leaves subcoriaceous, spatulate, opposite, divaricate, in 1 or 2 pairs, 3-5-nerved, with cross-veins and often covered with a chain-like areolation, 4–5 lines long, sloping at base into a broad petiole as long as the blade. Collected in pools at Ottawa, Canada, by James Fletcher, July 1882.

Var. POLYPHYLLUS, Morong, Bot. Gaz. v. 51 (1880).

A dwarf form 3–5 inches high, divaricately branching from the base, and very leafy throughout. Leaves very obtuse, 3-nerved. Not flowering, but abundantly provided with propagating buds which are found on the thickened and hardened ends of the branches, and closely invested by imbricated leaves. In a shallow pool, with oozy bottom, some distance under water, South Natick, Mass. (Morong); Fresh Pond, Cambridge, Mass. (Faxon).

Var. ELONGATUS, Ar. Bennett. Macoun's Cat. Can. Pl. Pt. 5, 371 (1890).

I have not seen a specimen of this form, but it is thus described by Mr. Bennett in Jour. Bot. for May, 1891, p. 151: "This differs from *pusillus* by the larger size of all its parts and very long internodes; leaves remarkably elongated; peduncles stout and long; spikes much longer; leaves often quite acute; flowers larger in all their parts. Habit of *rutilus*, Wolfg., and so named in specimens from Hungary in Herb. Mus. Brit." Coll. Macoun, Spallumsheen River, at and above Enderby, B. C.

Var. STURROCKII, Ar. Bennett, in Hook. Stud. Fl. 435 (1884).

This form occurs rather rarely in the United States. It is distinguished by its delicate, bright green, pellucid leaves, which are 1–3 inches long, obtuse or often apiculate at the apex and ½–¾ line broad. Mr. Bennett states that the British specimens are sometimes 5-nerved, but I have seen none with more than 3 nerves. There is often, however, at least in American specimens, a finely-reticulated space on each side of the midrib. The fruit, according to Mr. Bennett, is much smaller than in the type, with a short beak. This I have not seen.

P. pusillus seems to be the central species of a group, being approached on the one hand by *P. lateralis*, and on the other by

gemmiparus and *major*, all together forming a well-marked aggregate.

A widely-diffused species, common in Canada from New Brunswick to British Columbia, New England to Louisiana and Texas, west to Oregon and California. San Luis Potosi, Mexico, Schaffner, No. 533. Europe. Pools and ditches. July, August. (Plate LIII.)

30. POTAMOGETON GEMMIPARUS (Robbins) Morong, Bot. Gaz. v. 51 (1880).

P. pusillus L., var. ? *gemmiparus*, Robbins in A. Gray, Man. Ed. 5, 489 (1867).

Stems filiform, branching, terete, greatly varying in height, rising from 5 inches to 4 feet, according to the depth of water in which it grows; the internodes below, especially in deep water forms, as much as 5 inches in length. Leaves capillary, sometimes not as broad as the stem, often with no perceptible midrib, tapering to the finest point, 1–3 inches long, biglandular at base; stipules ½–1 inch in length, acute or obtuse, mostly deciduous. Rarely flowering, the spikes interrupted, 3–6-flowered; peduncles filiform, sometimes a little thickened, ½–2 inches long. Fruit exceedingly rare, and in size and shape like that of *P. pusillus*, except that it is flatter and somewhat impressed on the sides. It is commonly propagated by gemmae, which are abundant. The leaves and stems are often alike in thickness, so that the plant seems to consist of threads, and this with the long, naked internodes, renders its appearance very peculiar.

A few specimens in fruit were obtained at Amherst, Mass. by Prof. H. G. Jesup in 1874, and by him sent to Dr. Robbins, who thereupon substituted in his herbarium the name here adopted. It was first found by Dr. Robbins in the Blackstone Valley from Worcester, Mass. to Providence, R. I., and has since been collected by myself in the Charles River, at South Natick, Mass. Also by Mr. J. F. Collins, in Central Pond, R. I. Pools and slow moving streams. August, September. (Plate LIV. The rare fruiting form is seen on the right.)

31. POTAMOGETON DIVERSIFOLIUS, Raf. Med. Repos. 2d Hex. v. 354 (1808).

P. hybridus, Mx. Fl. i. 101 (1803).

We are obliged to drop the name of Michaux, because it had been previously employed by Thuillier for *P. heterophyllus* (Fl. Par. 1790), and that of Rafinesque comes next in date.

Stems flattened, sometimes terete, much-branched, but never recurved as sometimes occurs in *P. Spirillus*. Floating leaves coriaceous, the largest 12 lines long by 6 lines wide, oval, elliptical and obtuse or lance-oblong and acute. Petioles generally shorter, but sometimes longer than the blades, filiform or dilated. Submerged leaves setaceous, flat, in the typical form seldom over ¼ line in width, 1–3 inches long, 1-nerved, often with many fine lines and long reticulations on each side of the midrib. Stipules obtuse or truncate, hyaline, 3–5 lines in length, on the floating leaves free, on the submerged leaves commonly adnate to the petiole, but often free. Emersed peduncles 3–7 lines long and thickened upwards. Submerged peduncles 2–3 lines long, as long as the spikes, clavate, often recurved. Emersed spikes 3–5 lines long, occasionally interrupted. Fruit rarely over ½ line long and nearly as broad, 3-keeled, middle keel narrowly winged, usually with 7 or 8 knob-like teeth on the margin, the lateral keels sharp or sometimes rounded; style quite apparent as a short point, apical; embryo coiled 1½ times. This and the following species are much alike in general appearance and often confounded. In well-marked forms, however, the two may readily be distinguished not only by the difference in the submerged peduncles, but by the width of the submerged leaves, those of *P. diversifolius* being capillary or setaceous and only 1-nerved. Sometimes the leaves are broader, and then the chief mark of distinction lies in the submerged peduncles. Both species are really intermediate between the section of Potamogetons with free stipules and that with adnate stipules, as in the uppermost leaves the stipules are free, and adnate only in the lower. In extent of adnation this species approaches the former and the following species the latter.

Var. MULTI-DENTICULATUS, Morong, n. var.

Varies from the type in the numerous teeth on the fruit, as many as 12 being sometimes found on the middle keel, and each

lateral keel with 6 or 8 more. Frequently the teeth are bristle-like, and sometimes 2-pronged. The submerged leaves are from ¼ to ½ line in width, rarely as narrow as in the type. The most distinctly-marked specimens of this form were collected by Mr. C. F. Parker in a pond at Rehoboth City, Delaware, August 7, 1878. I have since noted the following localities for it: Noank, Conn. (Morong); ponds on the Susquehanna and at Easton, Pa. (Porter); Florida (Curtiss, Regel, No. 72); Lower Louisiana (Langlois).

Var. TRICHOPHYLLUS, Morong, n. var.

About 6 inches in height, without floating leaves, the submerged leaves as fine as floss silk, and entirely destitute of nerves.

Coll. N. L. Britton, Lake Marcia, Sussex Co. New Jersey.

The species in pools and ponds from New England to Nebraska, and south to Florida and Texas, San Luis Potosi, Mexico (Schaffner No. 534 and Parry and Palmer No. 856). Cuba (Wright). It ranges farther to the south than *Spirillus* and not so far north. It occurs in Maine, but Prof. Macoun expresses a doubt whether the Canadian forms attributed to this species are not *Spirillus* and such as I have seen from Canada confirm his opinion. (Plate LV.)

32. POTAMOGETON SPIRILLUS, Tuckerm. Am. Jour. Sci. and Arts, 2d series. vi. 228 (1848).

P. Zetterstedtii, Wallm. ap. Sch. et Mohl. Bot. Zeit. i. 256 (1843)? (fide Bennett Jour. Bot. xxviii. 298.)

Stems compressed, much branched, the branches often short and recurved, 6–20 inches high. Floating leaves coriaceous, obtuse, usually opposite and in several pairs towards the summit of the stem, oval or elliptical, varying to lanceolate, the largest about 12 lines long by 6 lines wide, sometimes narrow-oblong, deeply impressed beneath by 5–13-nerves. Petiole commonly about equal to the blade, but sometimes only ¼ or ½ its length, somewhat dilated. Submerged leaves linear, obtuse or abruptly acute, 1½–2 lines long and ¼–½ line wide, uppermost sometimes 1 line wide, usually 3-nerved, the lateral nerves near the margin, rarely with 5 very delicate nerves, often with irregular reticulated spaces on each side of the midrib. Stipules, like those of the preceding species, on the uppermost floating leaves entirely free, on the lower adnate to the petiole near the base, on the submerged adnate to

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the leaf for about one-half their length. In dried specimens, the stipules appear free from all the floating leaves. Emersed peduncles usually similar to those of the preceding species. Submerged peduncles usually wanting, or at most, hardly 1 line long. Spikes above water 3–5 lines long, continuous, while the lower are mostly sessile in the axis of branches, capitate aud ripening from 1 to 4 fruit. Fruit cochleate, very thin, nearly fleshless, roundish, about ¾ line long and nearly as broad, flat and deeply impressed on the sides, 3-keeled on the back, middle keel winged, wing broad and with 4 or 5 large teeth or very narrow and without teeth, the lateral keels rounded; style usually marked on the dried fruit only by a slight projection or a scar; embryo commonly coiled about 1¾ turns. The spiral markings of the embryo are distinctly seen in the dried fruit, and are a very distinctive feature, strongly reminding one of a small snail shell.

Pools, ditches and ponds. Nova Scotia (Mrs. E. G. Britton); New Brunswick, Quebec and Ontario (Macoun). Common in New England, and west to Minnesota, Missouri (Blankenship) and Nebraska, south to Pennsylvania and Virginia. (Plate LVI.)

33. POTAMOGETON FILIFORMIS, Pers. Syn. i. 152 (1805).

P. marinus of authors, not L. Herb.

Stems from a running rootstock, slender, 3–20 feet in height, filiform above, stout and thick towards the base. Flowers on long, often drooping peduncles, the longest measuring 6 to 8 inches, 2–4 in a whorl and the whorls ¼–1 inch apart. Leaves numerous, 2–10 inches long and from ⅛ to ¼ line, very rarely ½ line, broad, 1-nerved, with a few cross nerves. Sheaths about 1 line long, and the free part of the stipule ½ inch more, scarious on the edges. From 3 to 12 drupes are ripened in a verticil. Fruit 1–1½ lines long and about ¾ line wide; sides even; back not keeled in fresh specimens and scarcely so in the dry; face nearly straight or obtusely angled near the top; stigma nearly or quite sessile, remaining on the dry fruit as a broad truncate projection, apical or subapical; embryo circle incomplete, the apex pointing slightly inside of the basal end.

Var. MACOUNII, Morong, Macoun's Cat. Can. Pl. pt. 4. 88 (1888.)

Quite a distinct form with leaves 1–3 inches long, the largest ½ a line or a little more in width, obtuse, stiff, with a strong mid-

rib and raised or slightly revolute margins. Fruit small, rarely more than a line in length and ¾ of a line in breadth. Peduncles short, not more than 8 or 10 lines long at the most. This form commonly has a compact, bushy habit which is quite noticeable. Occurs in brackish and salt lakes of the prairie region, in Old Wives' Lakes and Crawling Valley, south of the Hand Hills, Alberta, Canada (Macoun). This approaches:

Var. *occidentalis*, Robbins, Bot. King's Ex. 339 (1871).

This as described by Robbins has some of the leaves similar to those of the preceding variety, but the peduncles often as much as 6 inches long, the fruit roundish-obovate, and the sides of the nutlet made "uneven by a central elevation partially surrounded by a shallow depression which is marginned by the raised lateral keel." Ruby Lake, Nevada, 6,000 feet alt., (Watson); Shoshone Geyer Basin, Wyoming (Clifford Richardson).

The species is rare in the United States, and was first detected by myself in the rapids above Niagara Falls in 1875, and since in similar rapids at Sault Ste. Marie, Mich. It is abundant in Seneca Lake, N. Y., and Mr. Hill has obtained it in Hemlock Lake, Western New York and Frankfort, Mich. It is more common in Canada, having been obtained by Prof. Macoun in brackish marshes on the sea coast at the Island of Anticosti, and in fresh water lakes and creeks in the Northeast territory, Manitoba and British Columbia. August. (Plate LVII.)

34. POTAMOGETON PECTINATUS, L. Sp. Pl. 127 (1753).

Stems slender, from a running rootstock, much branched, the branches repeatedly forking, 1 to 3 feet in height, usually much stouter below. Leaves setaceous, attenuate to the apex, 1-nerved, 1–6 inches long, often capillary and without nerves. Gigantic forms were collected by Prof. W. R. Dudley in Lake Cayuga, from 18 to 20 feet in length, and with leaves even 10 inches long. The form *scoparius*, Wallr., found in this country as well as in England, has numerous hair-like fasciculated leaves, very long and broom-like in appearance, whence the name. Stipules with sheaths which are white and scarious on the edges, ½–1 inch long, and half as much free. Peduncles filiform, 2 to 12 inches long, the flowers in approximate or distant verticils, 2 to 4 flowers

ripening 2 to 8 seeds, in a verticil. Fruit roundish obovate or obliquely obovate, with a thick hard shell, 1½–2 lines long and 1–1¼ lines wide, without a middle keel, but with obscure lateral ridges on the back, plump on the sides, and curved, occasionally a little angled on the face; style distinct, straight or recurved, facial; embryo apex nearly touching and pointing directly towards the basal end. In American plants, the keels are generally obscure and often obsolete, and the fruit more nearly approaches that of *filiformis* in size.

This species is frequently propagated by root tubercles which are nearly as large as peas and lie imbedded in the mud through the winter. In this state they are eaten by wild fowl, and the crops of these birds are often filled with them.

P. pectinatus and *P. filiformis* are often confounded, and in the absence of fruit it is impossible in all cases to make sure of the species. As a general rule *P. filiformis* is a smaller plant. In regard to the fruit, that of *P. pectinatus* may always be known from *filiformis* by its distinct and often recurved style, and usually it is larger. Both species occur in brackish water, sometimes in tidal and salt water, and also very extensively in fresh water.

Ponds and rivers. Widely distributed in Canada from Cape Breton to British Columbia and northwards (Macoun). In the United States it ranges from New England to Florida and Texas, and across the continent to Oregon and California. Lower California (Orcutt, Palmer). Southern Mexico (Helmsley). Cuba (Wright). A world-wide species, occurring in Europe, Australia, Africa and Asia. (Plate LVIII.)

35. Potamogeton latifolius (Robbins) Morong.

P. pectinatus, var. (?) *latifolius*, Robbins, Bot. King's Ex. 338 (1871).

Stem stout, white, branching, 2–3 feet high. Leaves numerous, flat, 1–3 inches long and 1–2 lines broad, 3–5 nerved, reticulate with many cross veins, obtuse or abruptly apiculate, the narrower ones acute. The part of the stipule adnate to the leaf, broad, many-nerved, scarious-margined, ½–1 inch long, the free portion shorter. Peduncles 1–3 inches long. Spikes interrupted. Mature fruit much like those of *pectinatus*, while the foliage differs greatly.

Fruit about 2 lines long by 1½ lines wide; back usually without a keel, the lateral ridges rounded; face gibbous at the top; style facial, rather long, erect or slightly recurved; embryo apex pointing slightly inside of the basal end. Often in the fruit the curve of the back rises at the top almost as high as the style, making that appear as if on the face, a peculiarity which occurs sometimes in *pectinatus* also. It is a question whether this form is the same as the broad-leaved forms of *flabellatus*, but it differs from that species not only in fruit characters, but in having many short lateral branches, shorter and more obtuse leaves, and a stouter and stricter stem.

The plant described by Robbins was collected in the "running brackish waters of Humboldt River below Humboldt Lake," Nevada. A fine specimen is in the Herb. of Mr. I. C. Martindale, of Camden, New Jersey, collected by Mrs. R. M. Austin in Goose Lake, Northeastern California, in Sept. 1884. The fruit here described is taken from that specimen. (Plate LIX.)

36. POTAMOGETON INTERRUPTUS, Kitaibel; Schultes, Œst. Fl. Ed. 2, 328 (1814), fide Ar. Bennett.

P. flabellatus, Babington, Man. Bot. Ed. 3, 343 (1851).

From a running rootstock which often springs from a small tuber. Stems stout, branching, 2–3 feet in height, the branches spreading like a fan. Leaves linear, obtuse or acute, 3–5 inches long, 1 line or a little more in width, 3–5-nerved, with many transverse veins.* Narrow, 1-nerved leaves occur on some plants, and these are acuminate, much like those of *P. pectinatus*. Stipule on the adnate part ½–1 inch long, without scarious edges, or narrowly scarious, the free part shorter and scarious, obtuse. Peduncles 1–2 inches long. Spikes slightly interrupted.

Our United States plants have never been observed in fruit, but I am able to give the fruit characters from specimens kindly

* It should be noted that Mr. Fryer regards these broad leaves as belonging mostly to sterile or autumnal shoots. Normally, as he describes the leaves, they are narrow or setaceous like those of *pectinatus*. The chief difference between the species and *pectinatus*, in his opinion, lies in the fruit. But as these broad leaves are the only ones so far found in the United States, and as they are the kind originally attributed to the species by Prof. Babington, I can only pay regard to them in this account of our species.

furnished by Mr. Fryer and collected by him in Cambridgeshire, England, where the plant is common. Fruit broadly obliquely obovate, obtuse at base, the largest 2 lines long by 1 ¾ lines wide, prominently keeled and with rounded lateral ridges on the back; face nearly or quite straight, sometimes gibbous at the top; style facial, erect; embryo outline obovate, the apex pointing slightly inside of the basal end. The shell of the drupe is exceedingly thick and quite hard.

First found by Mr. E. J. Hill in ponds at Manistee, Mich., and subsequently collected by myself in the same locality. Also collected by Mr. Hill in the Channel Islands, St. Mary's River, Mich. Mr. Hill takes especial notice of the tubers by which this species is frequently propagated. This method of propagation it has in common with *P. pectinatus*, to which it is closely allied. (Plate LX.)

37. Potamogeton Robbinsii, Oakes, Hovey's Mag. May, 1841, p. 2.

Stems stout, widely branching, 2–4 feet high, from running rootstocks sometimes 10 or 12 inches long. Leaves 3–5 inches long, 2–3 lines wide, acute, finely many-nerved, crowded in 2 ranks, minutely serrulate under the lens, auriculate at the point of attachment with the stipule. Stipules with the adnate portion and sheathing base of the leaf about ½ an inch long, the free part from ½ to 1 inch, acute, persistent, white, membranous, mostly lacerate. Peduncles 1–3 inches long, the inflorescence frequently much branched and bearing from 5 to 20 peduncles. Spikes interrupted, ½–¾ inch long, flowering under water, but the rarest of all our North American species to form fruit. It is propagated very extensively by fragments of the stems, which throw out many rootlets from every joint. I have seen such rootlets from 6 to 10 inches long on floating specimens, and even a stem standing upside down in the mud and growing apparently as well as in the normal position. Very rarely in years when the waters are low, the flowering spikes rise above the surface and perfect a few fruit. Dr. Robbins never saw but one fruit, which was collected many years ago in Oregon by Hall, and this was split in two, Prof. D. C. Eaton taking one-half and Dr. Robbins the other. In the year

1880 Mr. E. Faxon had the good fortune to secure a few fruiting specimens in Jamaica Pond, Mass. Besides them I have never known another instance, although the plant is very prolific in the localities where it occurs, sometimes densely covering the bottoms of ponds for acres. Mature fruit obovate, about 2 lines long by 1½ lines wide, 3-keeled on the back, the middle keel sharp and prominent, the laterals rounded; face arched; sides with a shallow depression which runs into the face below the arch; style subapical, thick, slightly recurved, obliquely truncate; apex of the embryo pointing slightly inside of the basal end.

So far as known, confined to the northern part of North America. New Brunswick, Ontario, Lake Superior (Macoun); New England to Northern New Jersey, and westward to Oregon (Hall, Wilkes' Exploring Expedition). (Plate LXI.)

5. RUPPIA, L. Sp. Pl. 127 (1753).

Stems capillary, widely branched. Leaves very slender, alternate, 1-nerved, tapering to an acuminate point, with a membranous sheath at the base. Flowers on a capillary, spadix-like peduncle, naked, perfect, consisting of two sessile anthers, each with 2 large, separate cells, attached by the back to the peduncle, having between them several pistillate flowers, in 2 sets, on opposite sides of the rachis, the whole at first enclosed in the sheathing base of the leaf; stigmas sessile, peltate. In the development, the staminate flowers drop off, and the peduncle elongates, bearing the pistillate flowers in two clusters at the end. The flowers are fertilized above water, after which the peduncles coil up and are drawn beneath the surface. Fruit a small, obliquely pointed drupe, several in each cluster, pedicelled; embryo oval, the cotyledonary end inflexed, and both that and the radicle immersed.

Half a dozen or more species have been enumerated, but probably all may be reduced to two or three. In salt, brackish and fresh waters throughout the world.

1. Ruppia maritima, L. Sp. Pl. 127 (1753).

Stems often whitish, 2 or 3 feet high, the nodes irregular, naked, 1–3 inches long. Leaves 1–3 inches in length and ¼ line or less in breadth; sheaths membranous, 3–4 lines long and with a minute ligule or short free tip at the top. In fruit the peduncles

are greatly elongated, sometimes as much as 12 inches or even more; pedicels 4–6 in a cluster, ½–1½ inches in length. Drupes with a dark hard shell, about 1 line long, ovoid, often oblique or gibbous at base, pointed with the long style. The drupes vary a good deal in shape, usually simply conical with a short gibbous swelling at the base, sometimes with a strong spur-like projection and a curved outline, as in the form known in Europe as *R. rostellata*, Koch, which does not, however, differ otherwise from the type. Specimens with fruit of this shape are sent from Oregon by Mr. Howell. Forms with fruit nearly destitute of peduncles and pedicels, and broad strongly marked sheaths, similar in these respects to *R. brachypus*, Gay, occur at Wood's Holl, Mass., and at other places along the Atlantic coast. (Plate LXII.)

2. RUPPIA OCCIDENTALIS, S. Watson, Proc. Am. Acad. Sept. 25, 1890, p. 138.

R. lacustris, Macoun, Cat. Can. Pl. Pt. 5. 372, Nov. 1890.

A stoutish-stemmed plant 1–2 feet high, the branches forking in fan shape. Leaves 3–8 inches long, with large sheaths ½–1½ inches in length. Branches and leaves often thickly clustered at the nodes, the sheaths overlapping each other. Drupes large, 1½–2 lines long, of a thick pear shape, on pedicels ¾–1 inch long. Prof. Macoun states that the peduncles are bright red when fresh.

Coll. by Macoun in a saline pond at Kamloops, B. Columbia. Also collected by H. J. Webber in a saline region at Alliance, Box Butte Co., Nebraska. Mr. Webber writes that he found peduncles nearly 2 feet in length. (Plate LXIII.)

6. ZANNICHELLIA, L. Sp. Pl. 969 (1753).

Stems, flowers and leaf buds all at first enclosed in a hyaline envelope, a sort of spathe, corresponding to the stipule of *Potamogoton*, rising from a node. Staminate and pistillate flowers in the same axil; the stamen solitary, 2-celled, on a short pedicel-like filament; pistillate 2–5 or more in a special envelope of their own. The stamen is said to be 4-celled occasionally, but I never could find more than 2 cells. Ovary a flask-shaped body, stipulate at base, tapering into a short style, with a broad, hyaline stigma which is somewhat cup-shaped, and has irregular, angled or dentate edges. Sometimes the whole cluster of flowers is on a stipe

or peduncle. In fruit the stipe and style lengthen, and the ovary is prolonged iuto a flattish, falcate nutlet, ribbed or sometimes toothed on the back. Seeds corresponding to fruit; the embryo bent and coiled at the cotyledonary end.

Found in all parts of the world. Half a dozen different species have been described by authors, but most of them can be reduced to the following species, and probably not more than 2 or 3 species exist.

1. ZANNICHELLIA PALUSTRIS L, Sp. Pl. 969 (1753).

Flowering and ripening its fruit under water. Stems capillary, sparsely branched, from a creeping rhizome and fibrous roots, 1–2 feet high. Leaves 1–3 inches long, ¼ line or less in breadth, acute, thin, 1-nerved and with a few delicate cross nerves. Spathe or stipule separating from the leaves and fruit at maturity, persistent. Fruit 2–4, sometimes 6, in a cluster, falcate, 1–2 lines long, variously disposed, sometimes sessile, sometimes, as in forma *pedicellata*, J. Gay, each on a pedicel, or, as in forma *pedunculata* A. Gray, the whole cluster on a short peduncle. The fruit is generally ribbed or winged on both margins, but sometimes without an apparent rib and sometimes dorsally knobbed or toothed; style persistent, recurved, ½–1 line long. In var. *muricata*, Morong, which occurs in Texas and California, the fruit has distinct teeth on the back and is bristly-muricate on the sides. All these forms may sometimes be found on a single plant, or, at least, in the same cluster, and can hardly be regarded as varieties.

Fresh and brackish ponds and pools, sometimes in tidewater. Common throughout Canada and the United States, as well as in all other parts of the world. (Plate LXIV.)

7. NAIAS, L. Sp. Pl. 1015 (1753).

Slender, branching plants with fibrous roots, wholly submerged. Leaves opposite, alternate or verticillate in 3's or more, sheathing at the base, nerveless. Flowers monœcious or diœcious, axillary, solitary, sessile or pedicellate. Sterile flower with a double perianth, the exterior one entire or 4-horned at the apex, the internal hyaline, adhering to the anther; stamen sessile or stipitate, 1–4-celled, apiculate or 2-lobed at the apex, rupturing irregularly. Fertile flower of a single ovary which tapers into a short style

that is split somewhat irregularly into 2–4 subulate stigmas. The mature carpel is solitary, sessile, ellipsoidal, with a crustaceous pericarp; seed conformed to the pericarp, and the embryo to the seed, the plumule and radicle immersed. Generally the raphe is distinctly marked on the seed.

About 10 species are known, inhabitants of fresh water in tropical and temperate regions. Four species occur in North America, three of them belonging to the section *Caulinia*, as constituted by Willdenow, that is, species with the stems and backs of the leaves unarmed.

1. NAIAS MARINA, L. Sp. Pl. 1015 (1753).
N. major, All. Fl. Ped. ii. 221 (1785).

A diœcious plant with rather stout compressed stems commonly armed with teeth half as long as their breadth. Leaves opposite or in 3's, 6–18 lines long, about 1 line broad, with 6–10 spine-pointed teeth on each margin, and frequently several along the back. Sheaths with rounded lateral edges, the type form without teeth. The teeth vary much in size and number. Sometimes the stem is entirely naked, sometimes with only one or two teeth. The teeth on the leaf margins have a large basal prominence which often imparts a zig-zag appearance to the outline, this prominence being composed of several cells which buttress the yellow, 1-celled spine at the tip. Fruit large (2–2½ lines long), the pericarp, as well as the seed, rugosely reticulate, tipped with a long, persistent style and 3 thread-like stigmas; seed not shining. A polymorphous species, the extreme forms of which would hardly be recognized as belonging together. A. Braun enumerates 6 forms, of which his variety *Ehrenbergii*, with unarmed stem, the edges of the sheath furnished with 1–2 teeth, occurs in Florida (Dr. E. Palmer); and his variety *intermedia*, or very nearly that, with long, naked internodes, leaves narrow, linear, each margin with 5 or 6 large teeth, which are usually longer than the breadth of the leaf, without dorsal teeth, the sheath on each side with 1–4 teeth, and fruit nearly 3 lines long, occurs in Lake Cayuga, New York (Morong).

Besides these the two following well-marked forms occur in the United States:

Var. GRACILIS, Morong, Bot. Gaz. 10, 255 (1885).

Internodes 1–3 inches in length, with a few teeth near the upper part. Leaves scarcely ¼ line wide, with 15 to 24 large teeth on the margins and few dorsal teeth; sheaths with 2–3 teeth on each margin; seeds hardly 2 lines long and sculptured with about 25 rows of nearly square or irregularly oblong reticulations. The whole plant, at least when dry, purple tinged.

Florida (A. H. Curtiss, No. 2705). A form very nearly, if not quite this, was collected by Prof. Wm. R. Dudley off Canoga marshes, New York (Cayuga Flora, p. 104).

Var. RECURVATA, Dudley, Cay. Fl. 104 (1886).

Stems dichotomously branched, the branches and leaves recurved. Leaves 3–6 lines long, narrow, with 2–4 large teeth on each margin longer than their breadth, without dorsal teeth; internodes short, naked, or with 1 or 2 teeth; sheaths 1-toothed on each side.

Black Lake, Cayuga Marshes, New York (Dudley).

The species rare in North America. Canoga Marshes and Cayuga Lake, N. Y. (Morong, Dudley); Florida (Chap. Fl.); Utah (Parry); Lower California (Palmer.) Attributed by Watson in Bot. Cal. to Clear Lake (Bolander) and Huntington Valley, Nevada (Wheeler). Cuba. Occurs in Europe and Asia. (Plate LXV.)

2. NAIAS FLEXILIS (Willd.) Rostk. and Schmidt. Fl. Sed. 384 (1824).

Caulinia flexilis, Willd, in Act. Ac. Berol. 89 (1798).
Naias Canadensis, Mx. Fl. ii. 220 (1803).

Stems slender, dichotomously much branched. Leaves linear, pellucid, acuminate or abruptly acute, ½–1 inch long by ½–1 line wide, numerous and crowded on the upper part of the branches, with 25–30 minute 1-celled teeth on each edge; sheaths obliquely rounded, with 5–10 teeth on each edge. Diœcious. Fruit ellipsoidal, with very thin pericarp, 1–1¾ lines long and ¼–½ of a line in diameter; style long, divided into 3 short stigmas, persistent; seeds smooth, shining, sculptured, sometimes quite faintly, with 30–40 rows of squarish or hexagonal reticulations which are scarcely seen through the pericarp. The seeds are generally

straw colored, but sometimes quite dark; pericarp dull and dark. This species occurs in various forms, some of them very small and bushy, 2 or 3 inches high, others a foot or more high, and nearly capillary, the foliage generally a dusky purple, but sometimes a bright green.

Var. ROBUSTA, Morong, Bot. Gaz. x. 255 (1885).

Stem stout, comparatively few leaved, internodes long, sparsely branched, 3–6 feet high.

Ponds and rivers in Eastern Massachusetts, New York, Michigan and Texas.

The typical plant is widely diffused in North America, being found in Canada, from the Atlantic to the Pacific, and equally common in the United States and Mexico. It is as widely distributed in the Old World. (Plate LXVI.)

3. NAIAS GUADALUPENSIS (Spreng.) Morong.

Caulinia Guadalupensis, Spreng. Syst. 1. 20 (1826).

N. flexilis, var. (?) *fusiformis*, Chap. Fl. 444 (1860).

N. flexilis, var. *Guadalupensis*, A. Br. Seeman's Jour. Bot. ii. 274 (1864).

N. microdon, var. *Guadalupensis*, A. Br. Rep. Nat. His. Soc. Berl. June 16, 1868.

N. microdon, Morong, Bot. Gaz. x. 255 (1885).

Stems almost capillary, 1–2 feet high, numerously and widely branched from the base. Leaves numerous, ½–¾ of an inch long, ¼–½ of a line broad, acute, opposite or 3–5 fascicled, frequently recurved, with sheaths and teeth like those of *N. flexilis*, but generally with 40–50 teeth on each edge of the leaf. Fruit about 1 line long; pericarp dark and strongly marked by 16–20 rows of hexagonal or rectangular reticulations which are transversely oblong; seed straw-colored, not shining.

This species is easily confounded with *N. flexilis*, but is clearly distinct in its long narrowly outlined branches, its short leaves, and especially in the markings of the fruit and seed.

Florida (A. H. Curtiss, Chapman); Louisiana (Langlois); Texas (Lindheimer, Reverchon); Nebraska (T. A. Williams); Oregon (Howell). West India Islands (Duchassaing, Wright). Mexico (Müller). (Plate LXVII.)

4. NAIAS GRACILLIMA (A. Br.) Morong.

N. Indica, Willd. var. *gracillima*, A. Br. by Engelmann in A. Gray, Man. Ed. 5, 681 (1868).

Stems almost capillary, 6–15 inches high, much branched, the branches alternate; the whole aspect of the plant very graceful. Leaves numerous, opposite or often fascicled, 3–5 or more in the bundle, setaceous, ½–2 inches long, usually with about 20 minute teeth on each margin. The marginal teeth are erect, with 1-celled yellowish spiny tips as in the other species, buttressed by 2, sometimes 3 cells on the basal protuberance which give them the aspect of being 3 or more celled. Sheaths auricled, with 6 or 7 teeth on each auricle, the teeth standing upon setaceous divisions of the sheath. Dioecious. Styles bifid, the 2 stigmas very short. Fruit oblong cylindrical, about ½ line long by ¼ line in diameter, slightly curved inwardly, the pericarp straw-colored or often purplish, marked by about 25 rows of irregularly oblong reticulations; seed not shining.

This plant differs very decidedly from *N. Indica*, of which Braun made it a variety. It has more slender and longer leaves, smaller and fewer teeth, and different fruit from that of *N. Indica*, which is described as ovate. It has sometimes been called *N. minor*, a very different species, which is not known to occur in this country.

In pools and ponds, still water, Ashland, Worcester, Winchester and Stoneham, Mass. (Boott, Morong); Albany, New York (Peck); Woodstown, New Jersey (Commons). Tidal mud of the Delaware, Camden, New Jersey, and Bristol, Pa. (Porter); Missouri (Engelmann.) (Plate LXVIII.)

8. ZOSTERA, L. Sp. Pl. 968 (1753).

Marine plants with slender rhizomes which root at the joints. Stems branching, compressed. Leaves distichous, sheathing at the base, the sheaths stipuliform, with inflexed margins. Spadix linear, contained in a spathe which is merely a sheath with overlapping flaps in the lower part of a leaf, or, as some botanists prefer to say, the spathe is on a long peduncle and has a long foliaceous appendage at the top. Upon the spadix the two kinds of flowers are arranged alternately in two rows. Sterile flower merely an anther attached to the spadix near its apex, 1-celled, opening

irregularly on the ventral side; pollen threadlike. Fertile flower fixed on the back near the middle; ovary attenuate into a style as long as itself; stigmas 2, capillary. Mature carpels flask-shaped, membranaceous, rupturing irregularly, beaked by the persistent style. Seeds ribbed, the ribs showing through the dried pericarp, enclosed in a firm membranaceous test; embryo thick, ellipsoidal, the cotyledonary end contained in a longitudinal furrow.

Species 5 or 6, natives of temperate seas throughout the world. Of these 3 are found on the North American coast.

1. ZOSTERA MARINA, L. Sp. Pl. 968 (1753).

Leaves ribbon-like, obtuse at the apex, 1–5 feet or more long and 1–4 lines wide, having 3–7 principal nerves and many fine ones between them, the nerves often obscure. The sterile plants are generally larger and more vigorous than the fertile. Spadix ¾–2½ inches long; flowers about 3 lines in length, crowded, varying greatly in the proportionate number of each kind, and from 10 to 20 of each. Sometimes the anthers are arranged obliquely in 2's and 3's. Ovaries somewhat vermiform. At anthesis the stigmas are thrust through the opening of the spathe and drop off before the anthers on the same spadix open, showing that they are fertilized by pollen from other plants. The anthers at the time of anthesis work themselves out of the spathe and discharge the sticky, stringy pollen in the water, thus leaving the ovaries by themselves, which then appear regularly disposed in two rows. Seeds cylindrical, strongly 20-ribbed, about 1½ lines long and ½ line in diameter, truncate at both ends. The ribs show very clearly on the pericarp.

The plant described under the name *Z. Oregana*, by Dr. S. Watson in Proc. Am. Ac. 26. 131 (1891), was founded upon a single specimen in the Gray Herb., collected by Hall in Oregon in 1871. A careful examination of this shows that it is only our common *Z. marina*. The only substantial points on which Mr. Watson relies to establish the species are the long straight beak of the fruit and the lack of a foliar appendage on the spathe. The beak is characteristic of all *Zostera* fruit, and the single spathe on Hall's specimen has the appendage broken off, as the jagged edges seen under a lens distinctly show. I have seen scores of them in

dried specimens broken off in the same way. In every other respect the plant is *Z. marina*.

This species is common in sheltered bays and marsh ditches between high and low water mark along the Atlantic coast from Greenland to Florida, and on the Pacific coast from Alaska to California. Europe and Asia. (Plate LXIX.)

2. ZOSTERA MINOR (Cavol.) Nolte, in Reich. Ic. vii. 2 (1845).
Phucagrostis minor, Cavol. Phuc. Th. Anth. xiv. (1792).
Z. nana, Roth, Enum. Pl. Germ. p. 8 (1827).

A specimen which probably belongs to this species, collected at Key West, Florida, by Blodgett is in the Torrey Herb. Leaves 3–6 inches long, scarcely $\frac{3}{4}$ of a line wide, 1-nerved. It lacks fruit, however, to make its rank sure. The seeds of this species in English specimens are about $\frac{3}{4}$ of a line long, and smooth or very faintly striate, only 4 or 5 maturing in the spathe. (Plate LXX.)

3. ZOSTERA LATIFOLIA, Morong.
Z. marina, L. var. (?) *latifolia*, Morong, Bull. Torr. Club, xiii, 160 (1886).
Z. Pacifica, S. Watson, Proc. Am. Ac. 26, 131 (1891).

Rootstocks very thick, sending up a stout stem which is sometimes 8 or 10 feet in length. Leaves 2–4 feet long, 3–6 lines wide, the broadest having from 10 to 13 nerves and 7 or 8 striæ between each pair of nerves. Spadices 2-3 inches in length. Fruit 1½ 2 lines long by about 1 line in diameter, cylindrical, with a straight beak as long as itself and attached to the spadix by a short stipe, distinctly 20–25 costate. Pericarp membranaceous, splitting regularly along the face, the ribs of the seed marked upon the pericarp in the dried specimens.

Puget Sound (Nevins); Santa Barbara, Cal. (Mrs. R. F. Bingham); Bolinas Bay (Prof. E. L. Greene). Monterey (Dr. C. L. Anderson). (Plate LXXI.)

9. PHYLLOSPADIX, Hook. Fl. Bor. Am. ii. 171 (between 1834 and 1840).

Submerged marine plants with thickened rootstocks, sending up slender stems which bear the inflorescence at the summit or in clusters along the upper part. Leaves linear, grass-like, sub-

coriaceous, sheathing. Flowers diœcious, in spathes like those of *Zostera*. Spathes with membranous edges, the back thickened and terminating in long, leaf-like appendages. Spadix with a series of short, dilated, foliaceous flaps, which close over the flowers, spreading open at maturity. Sterile flowers of numerous sessile stamens, in two rows lying obliquely crowded against each other, 1-celled, dehiscing by a ventral slit, dorsally attached near one side about half-way up; pollen thread-like. Fertile flowers of sessile ovaries, attached above the base, attenuate into a short style; stigmas 2, capillary; ovules pendulous, orthotropous. Fruit coriaceous, indehiscent, beaked by the short persistent style, cordate-sagittate, projecting at base into 2 recurved wings or lobes, and attached to the spadix between them. Seeds globose, with a thick, membranous test; embryo thick, the radicular end flattened ovoid, the cotyledonary end cylindraceous and curved upon the radicle.

Two species only are known, occurring upon the Pacific coast; also on the Asiatic coast.

1. PHYLLOSPADIX TORREYI, S. Watson, Proc. Am. Ac. xiv. 303 (1879).

Rootstock usually covered with the fibrillose remains of old leaves. Stems slender, flat, 20 or more inches in height, bearing the spathes in clusters along the upper part. Leaves 3–6 feet in length, ½–¾ line wide, thick, opaque, smooth, obscurely 1–3 nerved, blackening in drying; sheaths very long with narrow, whitish, membranous edges. Spathes 2 or 3 in a cluster, 1–2 inches long, slightly curved, with broad, whitish membranous edges, each spathe on a peduncle ½–1 inch in length. Appendages of the fruiting spadix elliptical, those of the sterile oblong-ovate, both obtuse. Stamens cylindraceous, obtuse at both ends. Ovaries flask-shaped, in fruit laterally flattened and carinate on the back, about 3 lines long. Stigmas long, thrust out of the spathe at anthesis. Test reddish, somewhat shining.

Growing on rocks which are uncovered at low tide.

Santa Barbara, Cal. (Mrs. R. F. Bingham); Los Angeles (Parish Brothers); Bolinas Bay (Prof. E. L. Greene). July-August. (Plate LXXII and LXXIV.)

2. PHYLLOSPADIX SCOULERI, Hook. Fl. Bor. Am. ii. 171, t. 186 (before 1840).

Stems very short, an inch or two in height, bearing solitary spathes. Leaves 3-6 feet long, 1–2 lines wide, 3 nerved, with many fine striae between the nerves. Spadix appendages on both kinds of flowers elliptical, ½ inch long. Fruit broadly flattened, the lobes half as long as the body. In general appearance and inflorescense this is similar to the preceding species, but may be distinguished by its broader leaves, and especially by its short stems and single spathes.

Barclay Sound, Vancouver's Island (Macoun); Tilamook Head, Oregon (Henderson); Dundas Island, Columbia River, Oregon (Scouler). Russian River, Siberia (Ruprecht). (Plates LXXIII and LXXIV.)

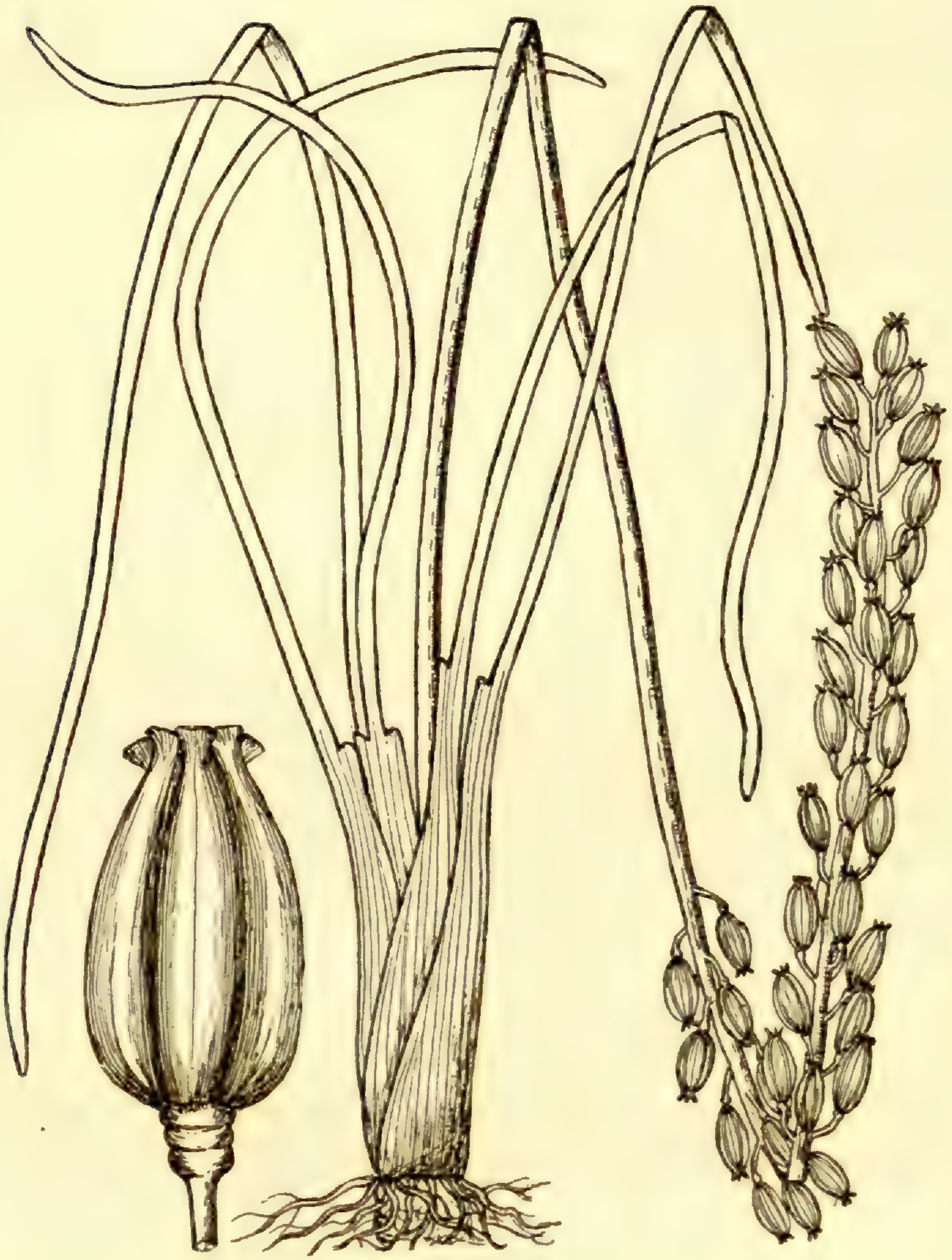
Since the sheets of this monograph went to press, I have received specimens of *Potamogeton foliosus* var. *Viagarensis*, collected by Mr. C. F. Wheeler in Cedar River, on the grounds of the Agricultural College in Michigan.

Also *P. rutilus*, Wolfg., collected by the same gentleman in the Detroit River, July 19, 1892.

Of the following plates a part were prepared by the author for another work, and are here used by permission.

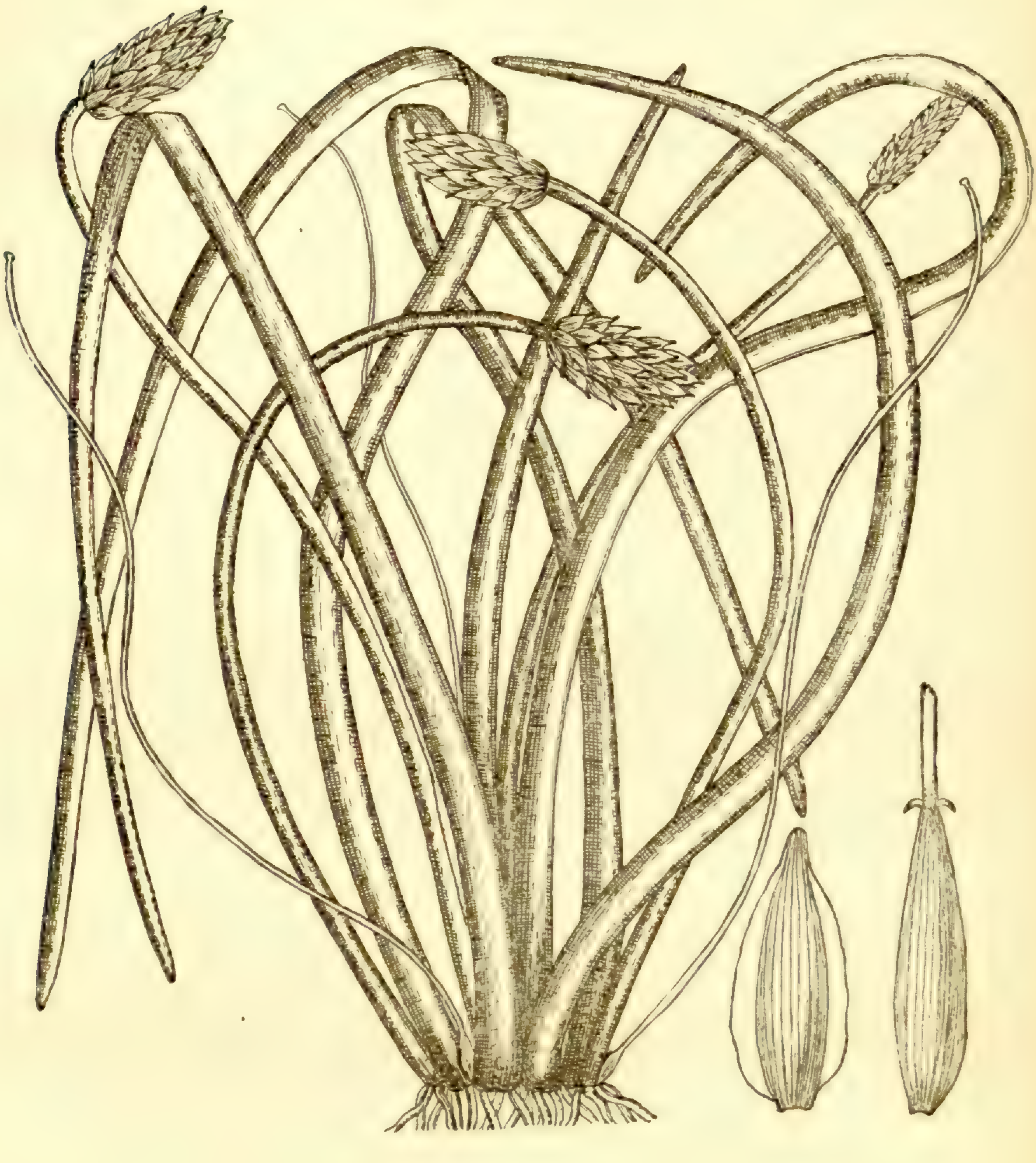
TRIGLOCHIN PALUSTRIS, L.

TRIGLOCHIN STRIATA, R. & P.



TRIGLOCHIN MARITIMA, L.

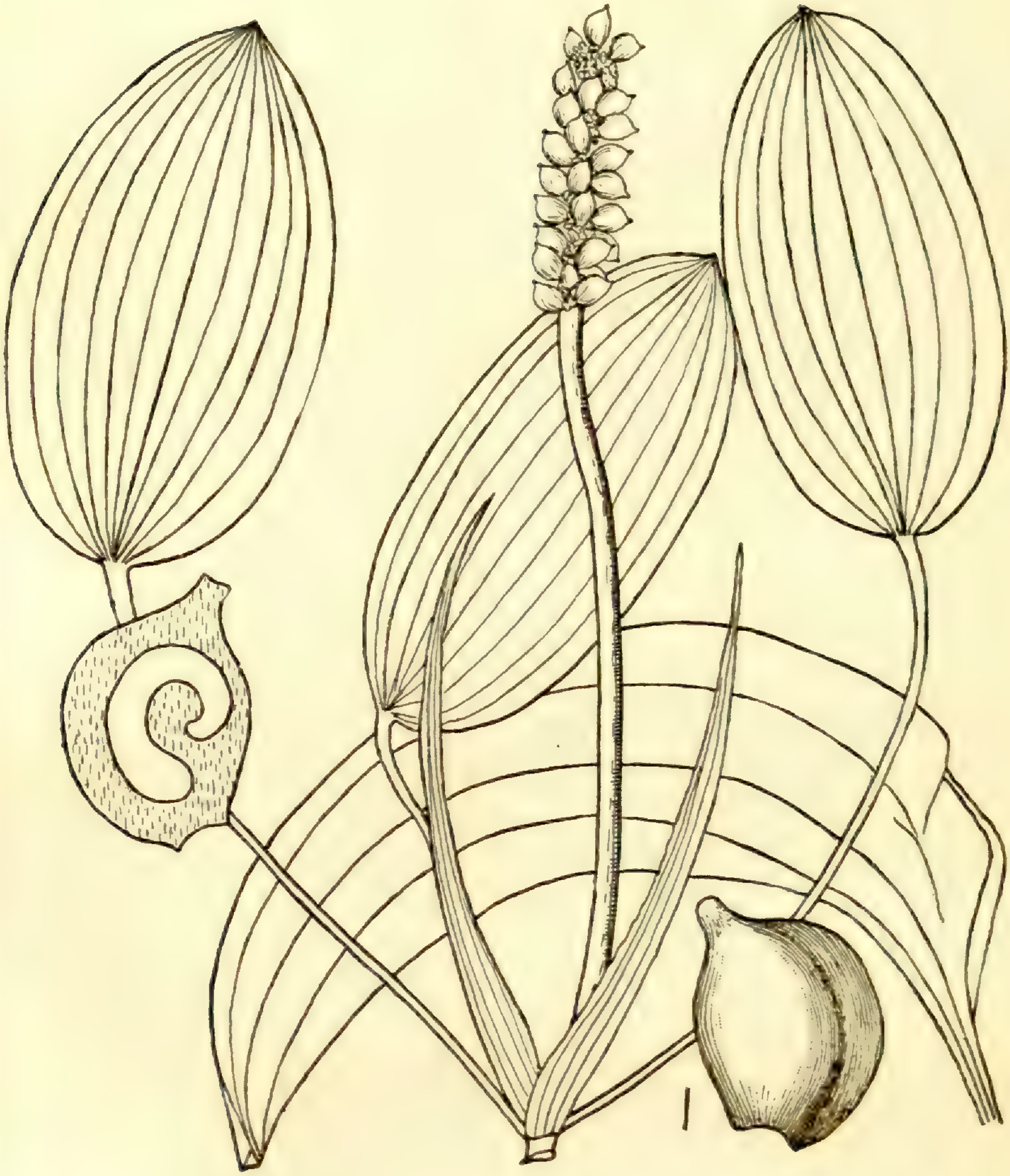
SCHEUCHZERIA PALUSTRIS, L.



LILÆA SUBULATA, H. & B.

POTAMOGETON NATANS. L.

POTAMOGETON OAKESIANUS, ROBBINS.



POTAMOGETON AMPLIFOLIUS, TUCKERM.

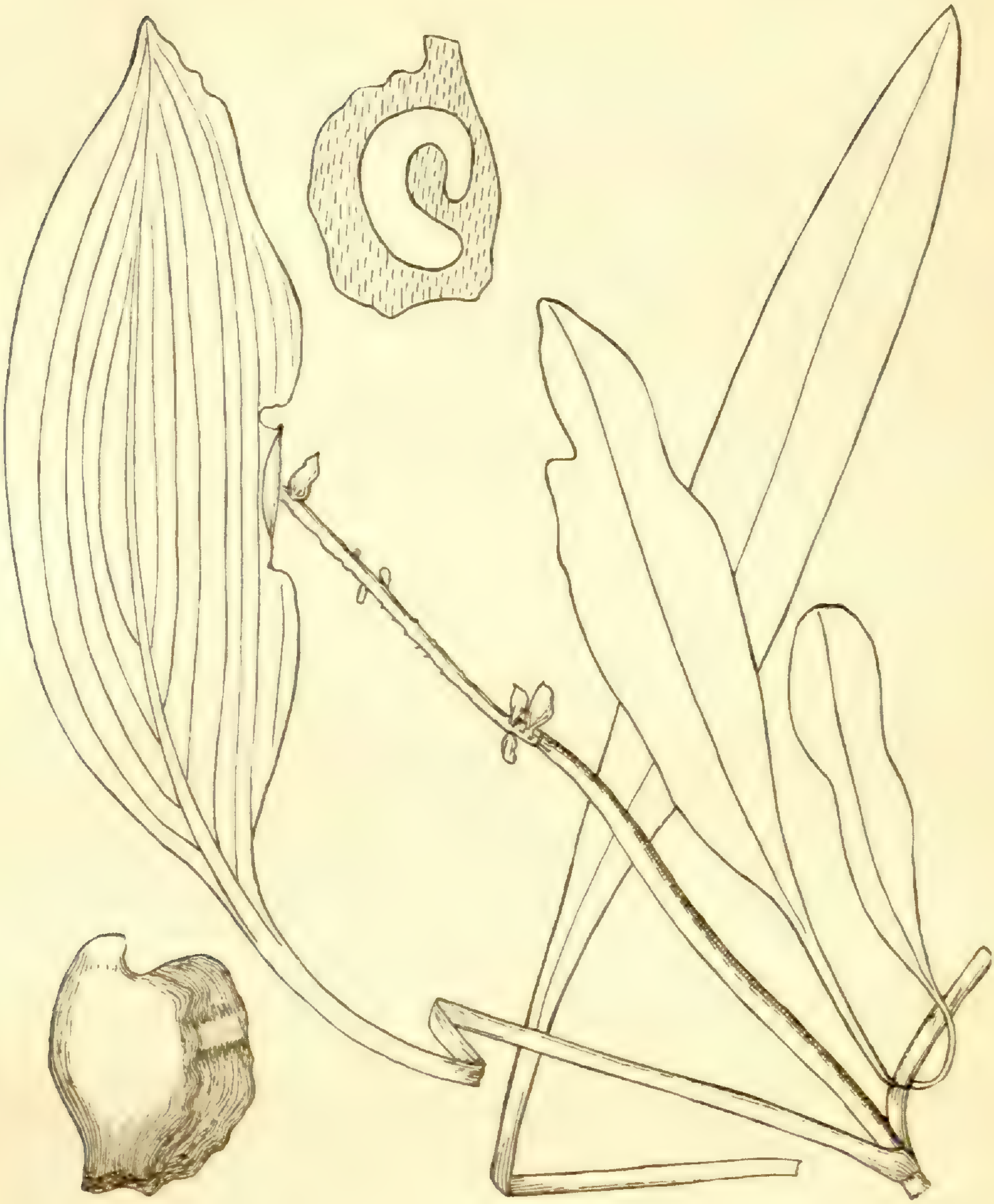
POTAMOGETON PULCHER, TUCKERM.

POTAMOGETON NUTTALLII. C. & S.

POTAMOGETON ALPINUS, BALBIS.

POTAMOGETON LONCHITES, TUCKERM.

POTAMOGETON FAXONI, MORONG.



POTAMOGETON MEXICANUS, A. BENNETT.

POTAMOGETON HETEROPHYLLUS, SCHREB.

POTAMOGETON SPATHULÆFORMIS (ROBBINS) MORONG.

POTAMOGETON ILLINOENSIS, MORONG.

POTAMOGETON ANGUSTIFOLIUS, BERCH. & PRESL.

POTAMOGETON LUCENS, L.

POTAMOGETON PRÆLONGUS, WULF.

POTAMOGETON PERFOLIATUS, L.

POTAMOGETON MYSTICUS, MORONG.

POTAMOGETON CONFERVOIDES REICHENB.

POTAMOGETON CURTISSII, MORONG.

POTAMOGETON CRISPUS, L.

POTAMOGETON ZOSTERÆFOLIUS, SCHUM.

POTAMOGETON HILLII, MORONG.

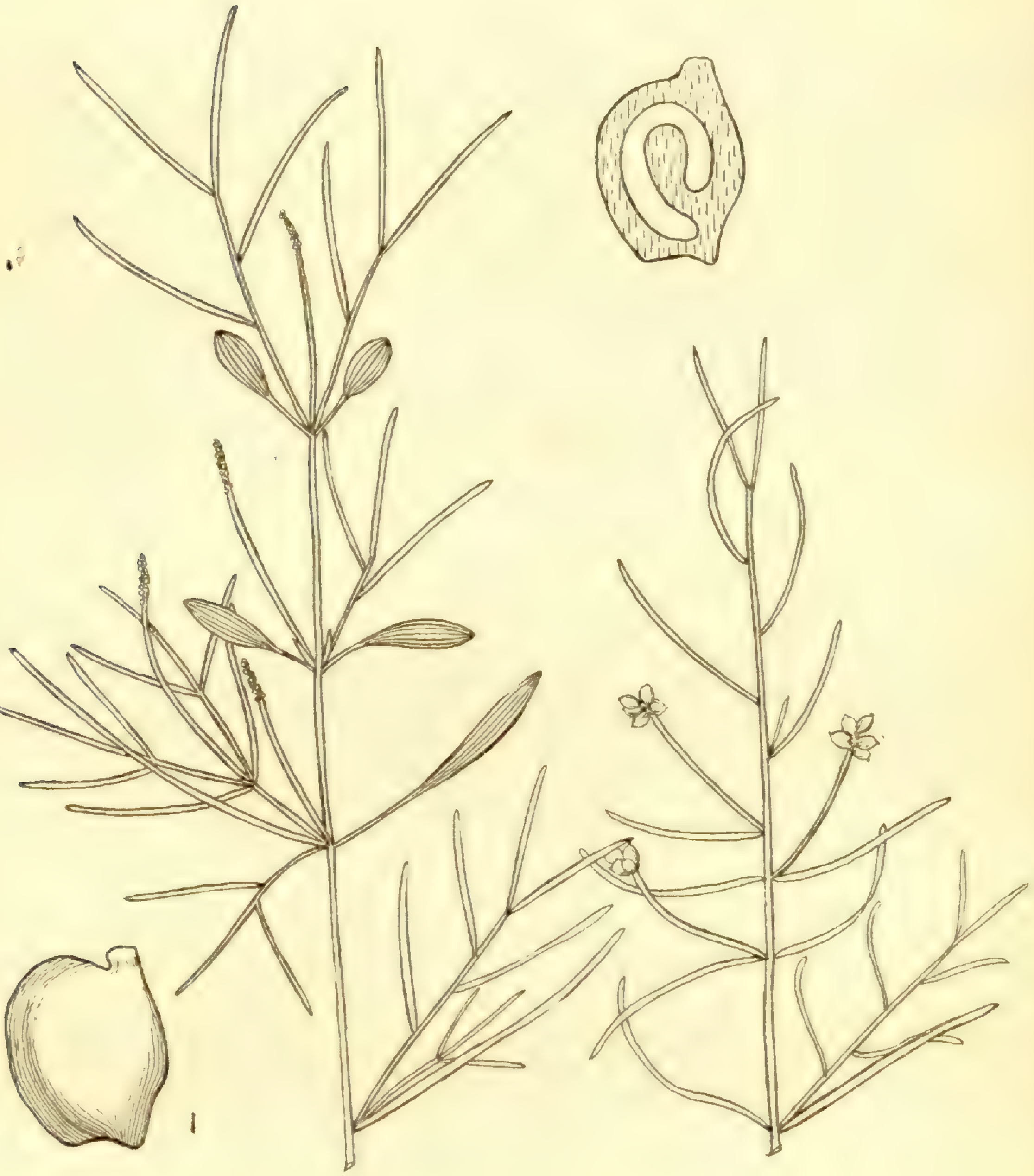
POTAMOGETON FOLIOSUS, RAF.

POTAMOGETON OBTUSIFOLIUS, M. AND K.

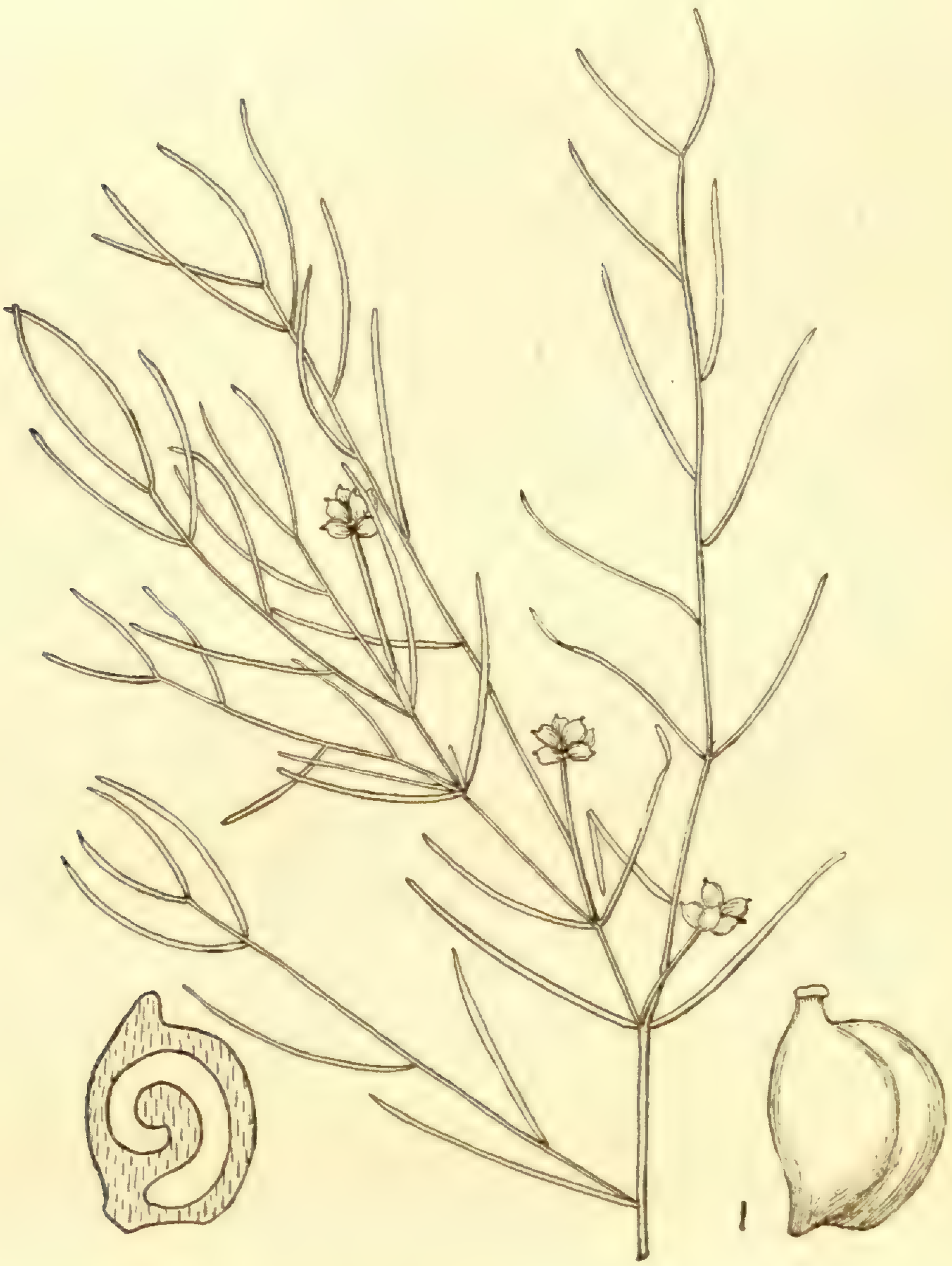
POTAMOGETON MAJOR (FRIES) MORONG.

POTAMOGETON RUTILUS, WOLFG.

POTAMOGETON VASEYI, ROBBINS.



POTAMOGE'TON LATERALIS, MORONG.



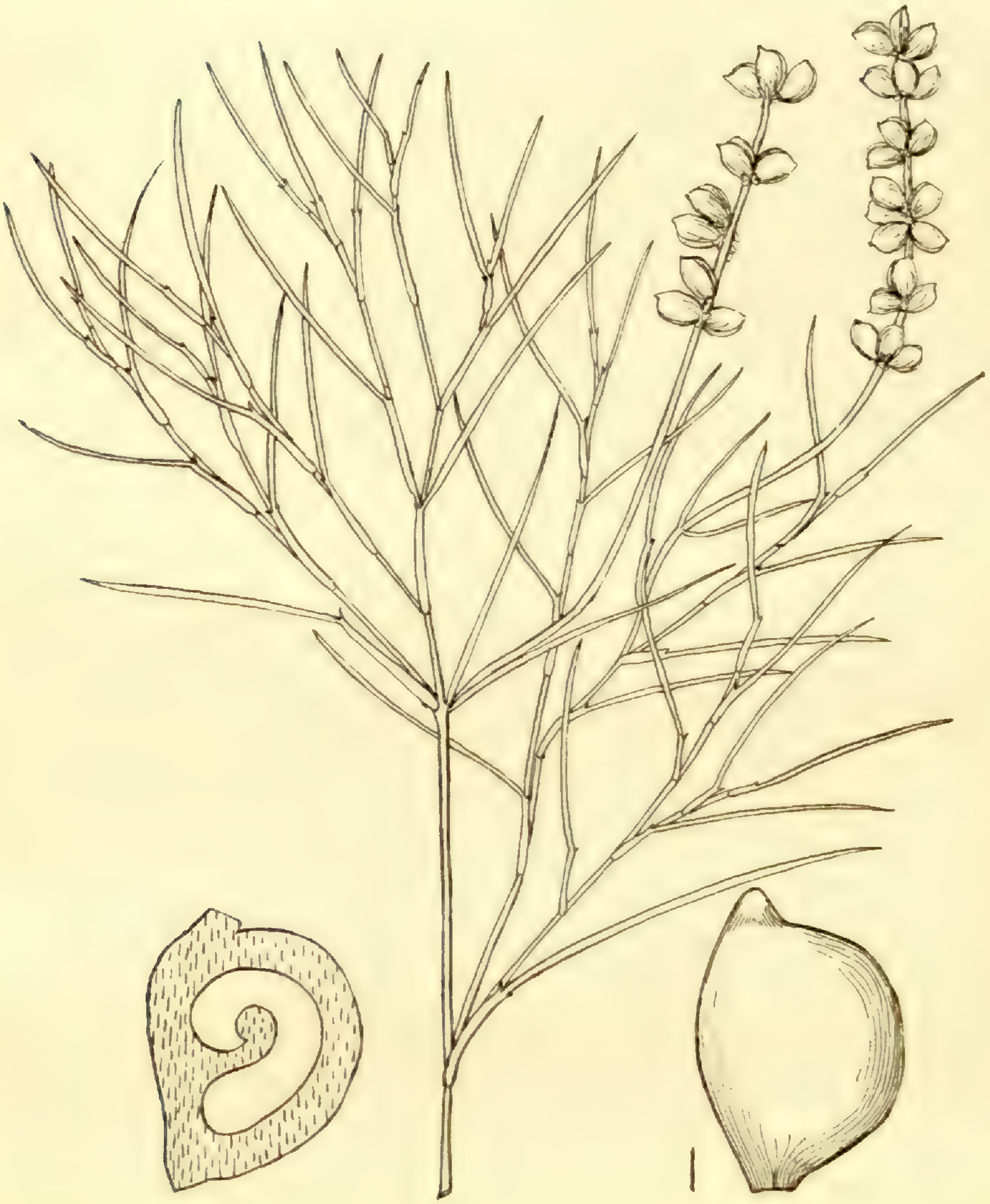
POTAMOGETON PUSILLUS, L.

POTAMOGETON GEMMIPARUS (ROBBINS) MORONG.

POTAMOGETON DIVERSIFOLIUS, RAF.

POTAMOGETON SPIRILLUS, TUCKERM.

POTAMOGETON FILIFORMIS, PERS.

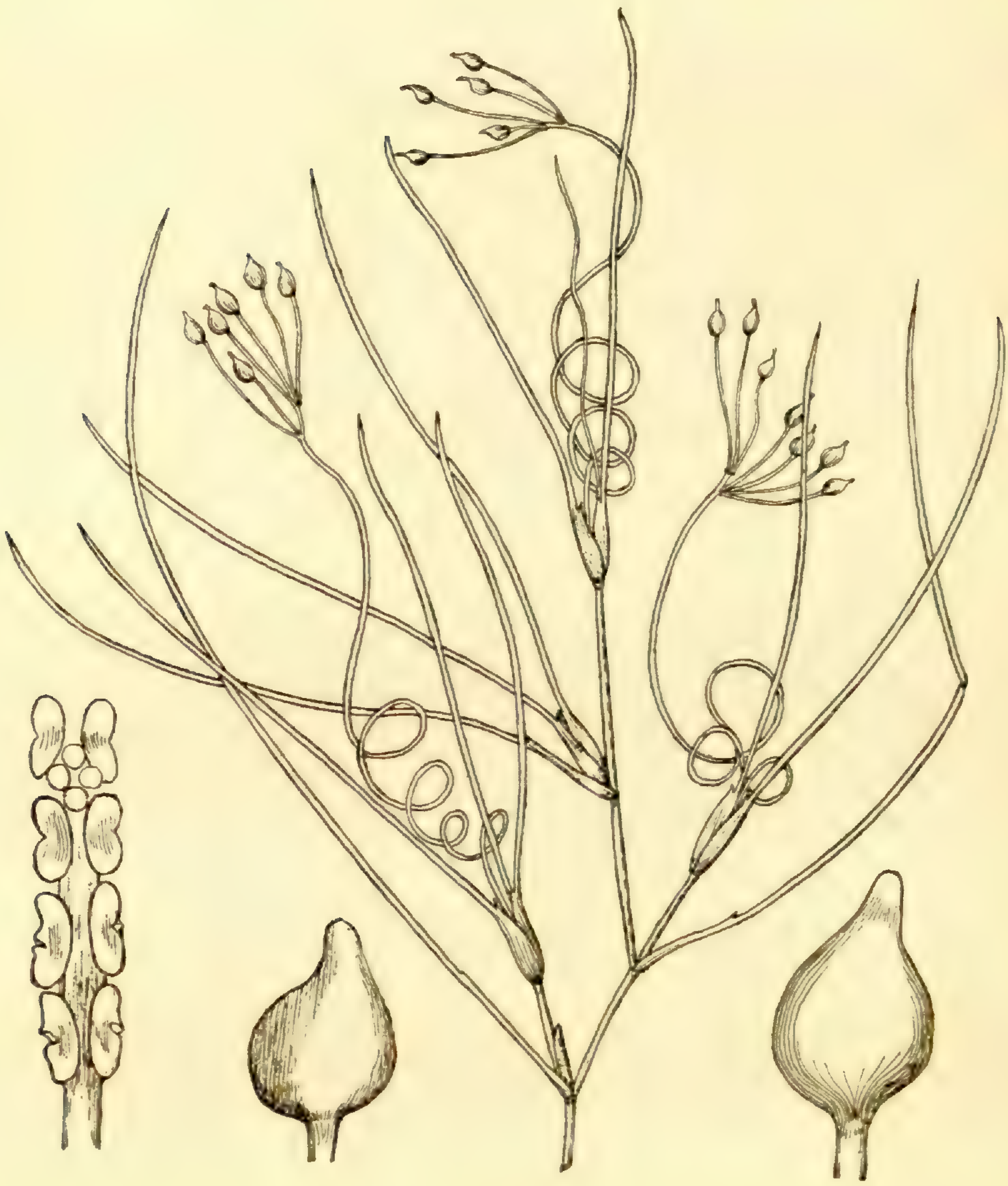


POTAMOGETON PECTINATUS, L.

POTAMOGETON LATIFOLIUS (ROBBINS) MORONG

POTAMOGETON INTERRUPTUS, KIT.

POTAMOGETON ROBBINSII, OAKES.



RUPPIA MARITIMA, L.

RUPPIA OCCIDENTALIS, S. WATSON.

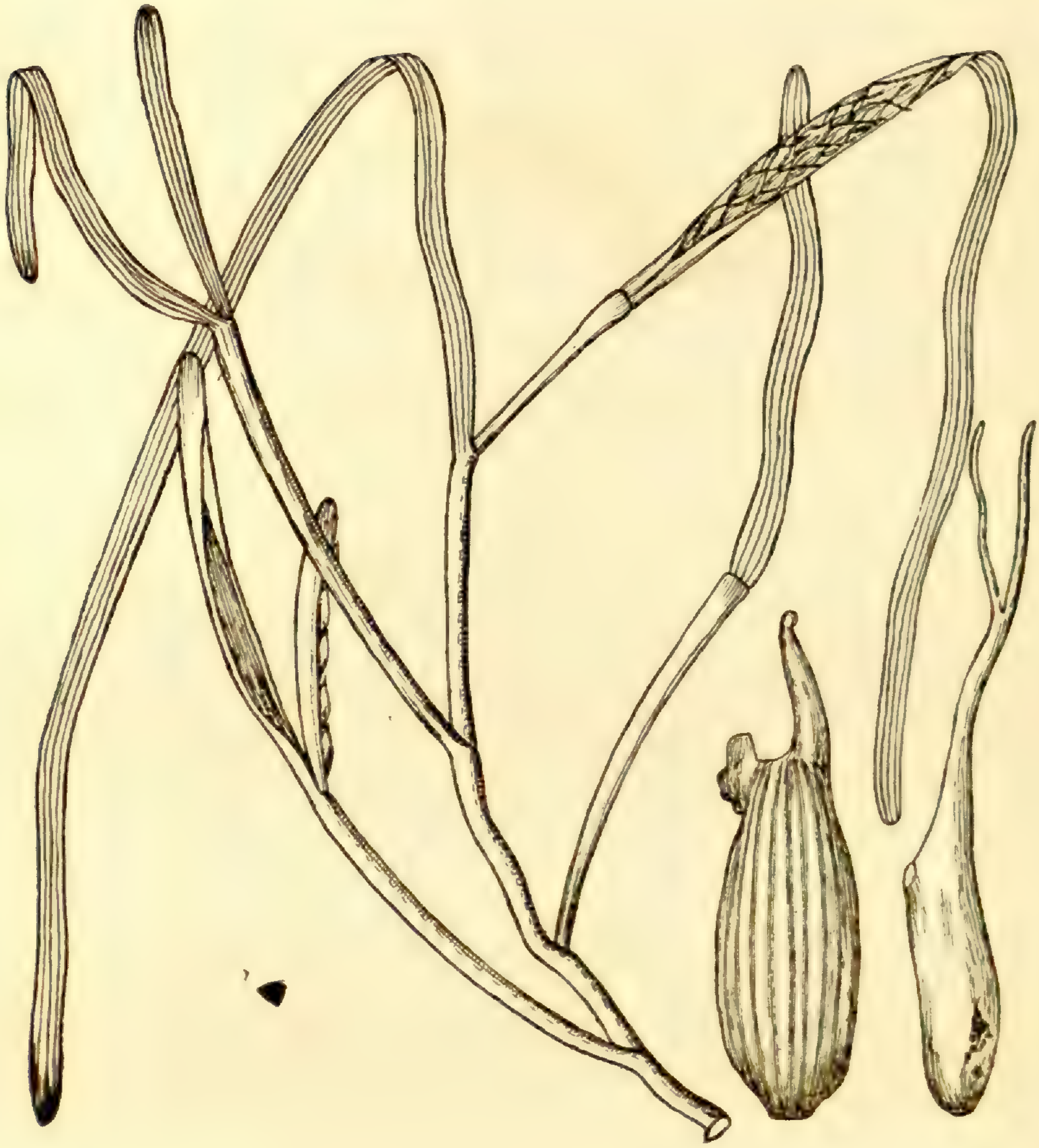
ZANNICHELLIA PALUSTRIS, L.

NAIAS MARINA, L.

NAIAS FLEXILIS (WILLD.) ROSTK. AND SCHM.

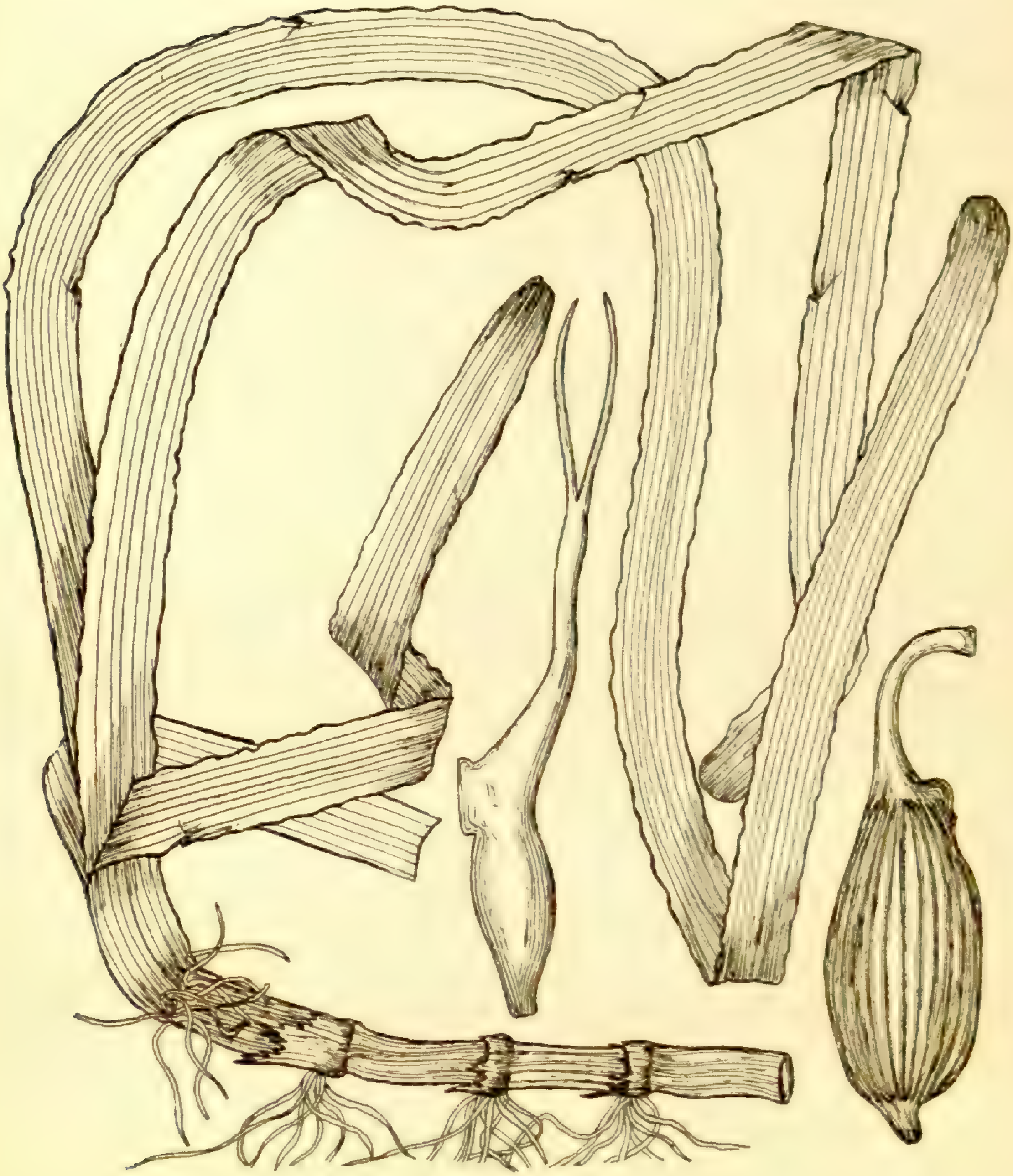
NAIAS GUADALUPENSIS (SPRENG.) MORONG.

NAIAS GRACILLIMA (A. BR.) MORONG.



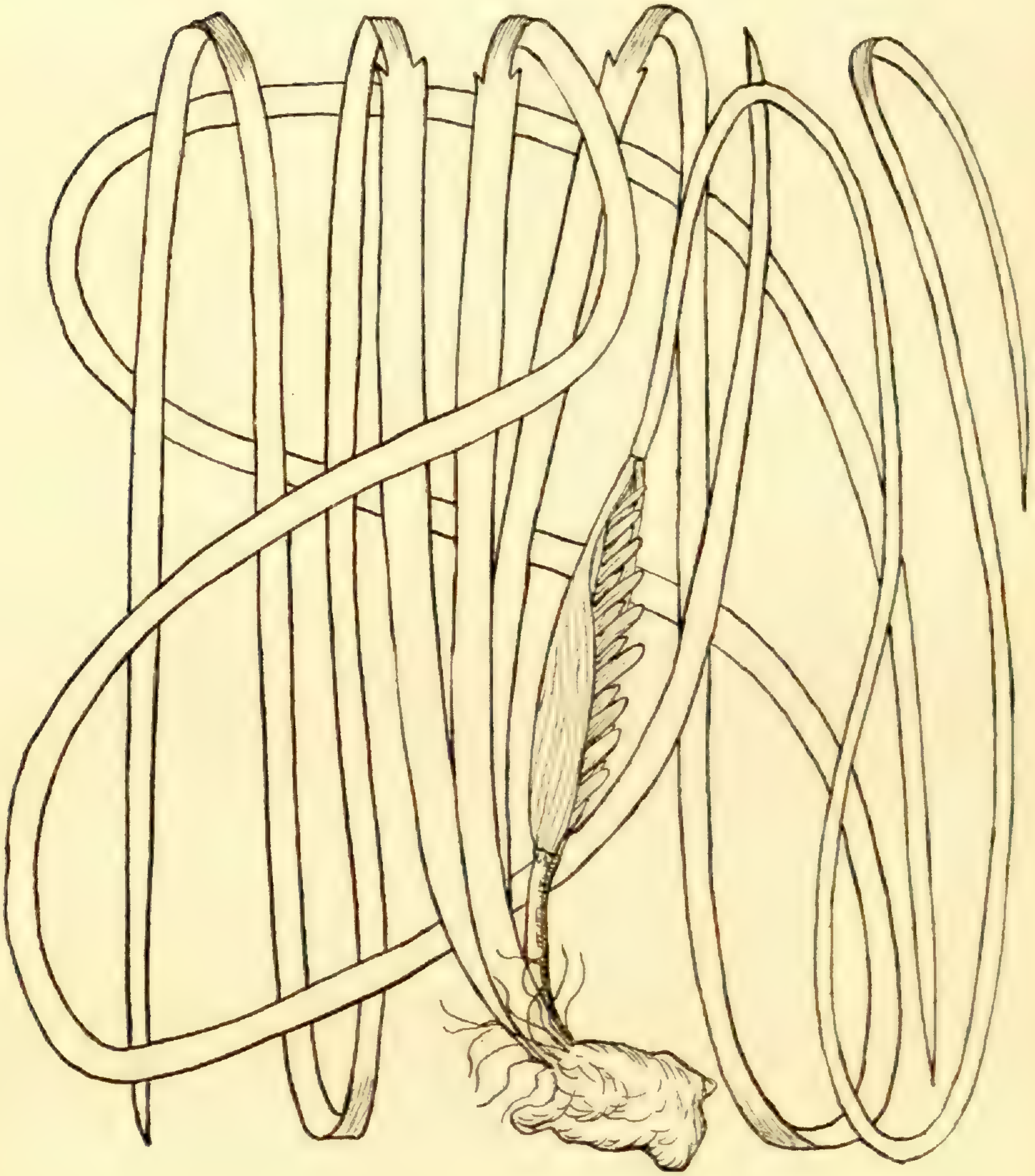
ZOSTERA MARINA, L.

NAIAS MINOR (CAVOL) NOLTE.



ZOSTERA LATIFOLIA, MORONG.

PHYLLOSPADIX TORREYI, S. WATSON.



PHYLLOSPADIX SCOULERI, HOOK.

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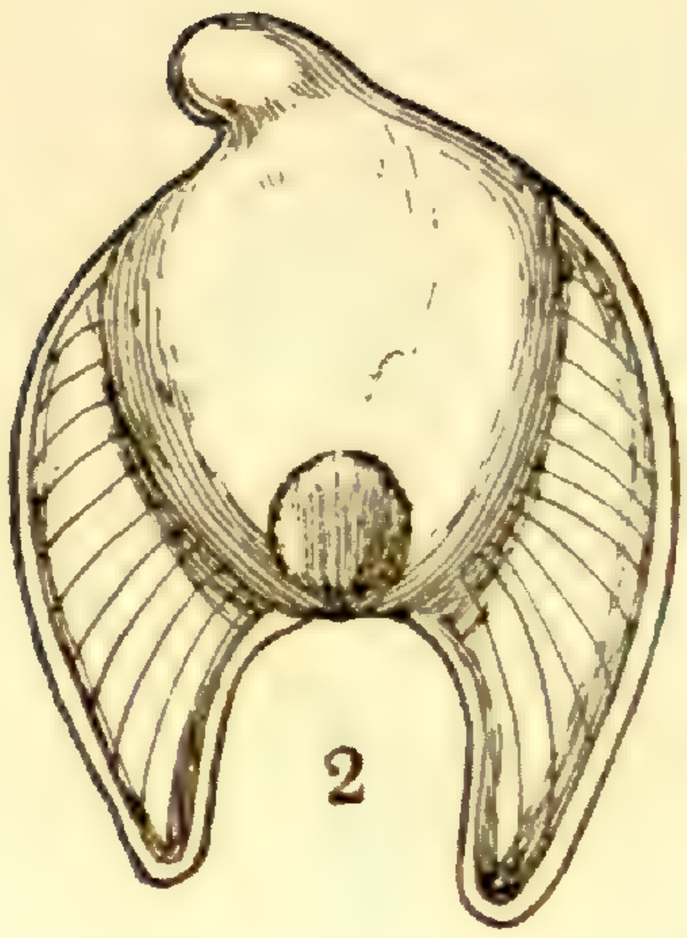

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PISTILS, SPADIX AND FRUITS OF PHYLLOSPADIX.
1, 2. P. SCOULERI. 3, 4, 5. P. TORREYI.

MEMOIRS

OF THE

TORREY BOTANICAL CLUB.

VOL. III. No. 3.

AN ENUMERATION

— OF THE —

PLANTS COLLECTED IN BOLIVIA

BY MIGUEL BANG,

WITH DESCRIPTIONS OF NEW GENERA AND SPECIES.

BY HENRY H. RUSBY.

ISSUED APRIL 28, 1893.

PRICE, - - - - 50 CENTS.

MEMOIRS

OF THE

TORREY BOTANICAL CLUB.

Vol. III. No. 3.

On the Collections of Mr. Miguel Bang in Bolivia.

By Henry H. Rusby.

Preliminary Remarks.

The study of the Bolivian flora, as represented in the collections made by myself in the years 1885 and 1886, the enumeration of which is still proceeding in the pages of the Bulletin, proved so interesting to Dr. Britton and myself that we became very desirous of having the collections continued. An opportunity to gratify this desire was found in 1889, when Mr. Miguel Bang consented to carry on the work which I had begun. Mr. Bang is the son of a Danish clergyman, educated in gardening at Kew, who went to Bolivia somewhere about the year 1883, for the purpose of collecting and sending to England living orchids. The enterprise proving unsuccessful, Mr. Bang engaged in other pursuits in the vicinity of La Paz, where I met him in 1885, and formed the acquaintance from which the present arrangement has resulted. Since Mr. Bang began collecting, the work has been pushed as steadily as circumstances would permit. It was hoped that the proceeds from the sale of specimens would more than pay the expenses of collection, so that Mr. Bang might derive more or less profit from the enterprise; but unfortunately such has not been the case. In spite of every effort and economy, I have found it necessary to supply a considerable deficiency, while Mr. Bang has received nothing beyond his expenses. Indeed, owing to a lack of ready funds, it has not been possible to fully utilize the time in collecting. It is very desirable that additional subscribers for the sets

may be secured. The annual collections range from 500 to 1,000 specimens per set, and are for sale at $10 per hundred.

For the benefit of botanists who may have occasion to consult these specimens, the following list of subscribers is appended. The names stand in the order in which the subscriptions were received, the earlier sets being the more complete. In consideration of facilities for study afforded by the Kew and Columbia herbaria, those institutions have been presented with their sets.

Set No. 1. Columbia College, New York City.
" 2. Capt. John Donnell Smith, Baltimore, Md.
" 3. Mr. Wm. M. Canby, Wilmington, Del. (The Canby Herbarium has now become the property of the New York College of Pharmacy.)
" 4. The Royal Botanical Museum, Berlin.
" 5. The Philadelphia Academy of Sciences, Philadelphia, Pa.
" 6. The United States Department of Agriculture, Washington, D. C.
" 7. The Gray Herbarium of Harvard College, Cambridge, Mass.
" 8. The Missouri Botanical Garden, St. Louis, Mo.
" 9. The University of California, Berkeley, Cal.
" 10. The Herbarium of the Royal Botanical Garden, Kew.
" 11. The Herbarium of the British Museum.
" 12. Wellesley College, Wellesley, Mass.
" 13. The Boissier Herbarium, Chambesy, Switzerland.
" 14. The Herbarium of the Royal Botanical Garden, Edinburgh.
" 15. The Breslau Botanical Garden.
" 16. The Imperial Academy of Science, St. Petersburg.
" 17. The Imperial Natural History Museum, Vienna.
" 18. Mr. J. C. Melville, Manchester, England.
" 19. Messrs. Parke, Davis & Co., Detroit, Michigan.
" 20. Rev. J. H. Wibbe, Schenectady, New York.

The Cryptogams are taken by Prof. L. M. Underwood, Greencastle, Ind.

The Glumaceæ are taken by Prof. W. J. Beal, Agricultural College, Michigan.

The woody plants are taken by Prof. C. S. Sargent, Brookline, Mass.

The collections will be enumerated in fascicles of 1,000 numbers. When necessary, as in the present instance, the fascicles will be divided into two parts, the first part including the Compositæ. A few doubtful or difficult species may be looked for in an appendix to each fascicle, in which place it will also probably be necessary to publish some corrections.

I have found invaluable the kind assistance of Dr. Britton, at every stage of the work, but particularly in having compared the specimens at the Kew herbarium, and indicated those which could not be matched there. In very few instances have I found it possible to find published descriptions of such species.

I am also indebted to Messrs. Bennett and Chodat, for their judgment upon the Polygaleæ, to Herr Urban who has reported upon the Loasaceæ, and especially to M. Cogniaux for having given me the benefit of his remarkable knowledge of the Melastomaceæ.

RANUNCULACEÆ.

CLEMATIS COCHABAMBENSIS, sp. n. Climbing, shrubby, the stem sharply angled and downy, the younger portions tomentose; leaves 4 or 5 cm. long, on petioles 3 cm. long, the latter terete, the base dilated and channelled, divaricate or reflexed and cirrhose; primary divisions about 3 pairs, the longest petiolules nearly 1 cm. long; primary divisions about thrice divided, of the ultimate divisions, the lateral 2—the terminal 3-lobed, with cuneate base, the lobes inequilaterally lance-oblong, acutish, thick and stiff, canescent, 1–2 mm. long and scarcely 1 mm. broad, rather densely massed; flowers not seen; panicles in fruit dense, several or perhaps many flowered, the flowers solitary in the upper axils; primary bracts similar to the leaves, the bracteoles opposite, lance-awl-shaped, deciduous; fruiting pedicels 2 cm. long, slightly angled, tomentulose; akenes about 25, lance-oval, sessile or on a slightly produced base, reddish-brown, glabrescent, the fully developed ones rather abruptly contracted into a stout, naked beak of the same color as the body, and shorter, the latter 3–4 mm. long; the densely plumose portion of the style nearly 3 cm. long, yellowish-white. Vicinity of Cochabamba, 1891 (759).

CLEMATIS BANGII, sp. n. Shrubby, climbing, glabrous except the inflorescence and fruit, the green or purplish stems strongly

(about 8) channelled, the internodes 10–15 cm. long; leaves somewhat disposed to be erect, both petioles and petiolules strongly cirrhose, the former channeled throughout and gradually dilated downward, 7–10 cm. long, slender; divisions of leaf apparently 5, the lower pair distant, all much alike, on long slender petiolules, lanceolate with rounded or slightly narrowed base, regularly tapering to an acute point, 7–10 cm. long by 1–2 cm. broad, some with a strong and sharp lobe upon one side, coriaceous with 2–4 sharp and strong parallel veins from near the base, prominently but sparingly reticulate; peduncles in flower about 5 cm. long, ribbed, the panicle compound, its few divisions each 5–8-flowered, the branches cinereous; lower bracts similar to the leaf divisions but narrower, the bracteoles elongated, strap-shaped and, like the pedicels and calyx, densely white hairy, or the bracteoles tawny; sepals 4, oblong, obtuse, tawny with narrow white margins, about 1 cm. long by 4 mm. broad, somewhat leathery, exceeding the numerous stout stamens; akenes numerous, light brown, with thick, lighter colored margins, villous, oblanceolate, about 5 mm. long, the base narrowed, the apex abruptly contracted into the style, which is plumose, but not densely so, throughout, 5–8 cm. long, very slender.

Vicinity of Cochabamba. 1891 (988).

Thalictrum podocarpum, H. B. K. Nov. Gen. v. 38. Songo, Nov., 1891 (893). Vicinity of Cochabamba, 1891 (758). = Rusby 501 and 502.

Ranunculus pilosus, H. B. K. Nov. Gen. v. 45. Vicinity of La Paz, 10,000 feet, 1890 (147). = Rusby 510.

Ranunculus repens, L. Sp. Pl. 779. Flowers double. Yungas, 1890, escaped (190). = Mandon 878. Dr. Britton informs me that all the Andean specimens in the Kew herbarium are double flowered.

ANONACEÆ.

Guatteria pogonopus, Mart. Fl. Bras. xiii. i. 34. Yungas, 1890. (583) = Rusby 1252.

BERBERIDEÆ.

Berberis Boliviana, Lechl. Berb. Amer. Austr., 21 (?). Songo, Nov., 1890. (863) = Mandon 864. Judging from the description in Chlor. And. 294, Mr. Bang's plant differs in the size and number of leaves, the number of flowers, and their disposition.

BERBERIS RECTINERVIA, sp. n. Fruticose, the stems virgate, leafy, nigrescent, unarmed; leaves 5–6, fascicled, persistent until after the appearance of an equal number of new ones, 8–15 mm. long, 3–5 mm. broad, oblanceolate to spatulate, tapering to the base, very thick, smooth, shining above, tipped with a short reddish-brown spine, entire, or a few with 1 or 2 spinescent teeth near the apex, underneath with several strong veins nearly parallel with the strong midrib; flowers solitary or 2-3 together, very short pedicelled, nearly or quite erect.

Songo, Nov., 1891, (857). Also collected by Pearce at La Banca at an altitude of 10,000 or 12,000 ft., *fide* Britton.

PAPAVERACEÆ.

Argemone Mexicana, L. Sp. Pl. 508. Vicinity of Cochabamba, 1891 (943).

Bocconia frutescens, L. Sp. Pl. 505. Yungas, 1890 (441).

CRUCIFERÆ.

Roripa Nasturtium (L.) Scopoli. (*Nasturtium officinale*, R. Br.) Vicinity of La Paz, 10,000 ft., 1889 (65).

Cardamine ovata, Benth., var. *corymbosa*, Britton, Bull. Torr. Bot. Club, xvi. 16. Yungas, 1890 (227). = Rusby 1206 and Spruce 5378.

Sisymbrium officinale (L.) Scopoli. Vicinity of Cochabamba, 1891 (888). A very scabrous form.

Sisymbrium myriophyllum, H. B. K. in D. C. Syst. ii. 477. Talca Chugiaguilla, Apr. 1890 (815).=Rusby 205.

SISYMBRIUM PAZENSIS, sp. n. Apparently biennial, grayish-hispid throughout, stem erect, 3–6 dm. high, stout, simple, purplish; leaves few, the radical not present; lowest cauline 3–4 cm. long, by 1.2 cm. broad, oblong-spatulate, obtuse, contracted into a petiole-like base, thick, with prominent midrib, both sides gray-hispid, coarsely few toothed; the upper similar, fewer toothed or entire, closely sessile; inflorescence of several erect crowded racemes, forming a narrowly contracted, nearly naked panicle, at length 20 cm. long; flowers 4–5 mm. long, about equalling the stout pedicel; calyx purple, two-thirds as long as the white (purplish?) petals; pods oblong-linear, 2 cm. long by 2 mm. broad, bright purple, seeds in 2 rows, very small.

Vicinity of La Paz, 10,000 ft., 1890 (172).

Lepidium bipinnatifidum, Desv. Journ. Bot. iii. 165. Vicinity of La Paz, 10,000 ft., 1889 (23).=Rusby 1201 and 1202.

Lepidium Chichicara, Desv. Journ. Bot. iii. 165. Vicinity of La Paz, 10,000 ft., 1889 (15).=Rusby 1203.

CAPPARIDEÆ.

Cleome spinosa, L. Sp. Pl. Ed. 2, 939. Yungas, 1890 (485).

Cleome gigantea, L. Mant. 430. Yungas, 1890 (645 and 645 a, as to specimens having the pedicels nearly smooth.

Cleome. Yungas, 1890 (645 a, as to specimens consisting of flowers only, the pedicels glandular-hairy).=Rusby 736.

VIOLACEÆ.

Viola scandens, Willd. in H. B. K. Nov. Gen. v. 371. Yungas, 1890 (704). A smaller and less luxuriant form than Rusby's 844 and 845. Also vicinity of Cochabamba, 1891 (882).

Viola veronicæfolia, Pl. and Lind. Ann. Sci. Nat. (IV.) xvii. 121. Yungas, 1890 (323). = Rusby 842.

Viola micranthella, Wedd. Talca Chugiaguilla, April, 1890 (811). = Mandon 942.

Calceolaria (Ionidium) Bangii, sp. n. Herbaceous, 3–6 dm. high, the stems terete, erect-branching, minutely puberulent; leaves membranaceous, alternate or a few of the lower sub-opposite, 2.5–5 cm. long, oblong to rhombic-oval, obtuse, acuminate, with a short and slender petiole, either bluntly or incisely dentate, smooth on both sides, paler below; stipules whitish, subulate, finely attenuate, 2 mm. long; flowers axillary, on narrowly filiform, naked peduncles, two-thirds as long as the leaves; flowers 3–4 mm. long; fruit 3–4 mm. long, twice the length of the calyx, globose, ribbed, tipped with a short, stout, whitish point.

Yungas, 1890 (553).

Leonia glycycarpa, R. & P. Fl. Per. ii. 69, t. 222. Songo, Nov., 1890 (846). = Rusby 2647.

BIXINEÆ.

Bixa Orellana, L. Sp. Pl. 512. Yungas, 1890 (214 and 606).

POLYGALEÆ.

Polygala filiformis, St. Hil. Fl. Bras. Mer. ii. 1. Yungas, 1890 (415).

Polygala Boliviensis, A. W. Bennett, var. *albiflora*, Chodat. Vic. Cochabamba, 1891 (947).

Monnina cestrifolia, H. B. K. Nov. Gen. v. 419. Yungas, 1890 (698).

Monnina parviflora, H. B. K. Nov. Gen. v. 419. Yungas, 1890 (292).

Krameria triandra, R. & P. Fl. Per. i. 61. Vic. La Paz, 10,000 ft., 1889 (119).

VOCHYSIACEÆ.

Vochysia Boliviana, sp. n. Branchlets blackish, quadrangular with rounded angles, strongly sulcate, flattened just below the nodes, the youngest pubescent, the internodes 4–6 cm. long by nearly 1 cm. broad; stipules subulate, coriaceous thickened at base, 1 cm. long; petioles very stout, 1.5–2.5 cm. long; leaves about 20 cm. long by 8 cm. broad, oblong-elliptical, the base rounded to sub-cordate, the apex abruptly produced into a short, stout, tapering but obtuse point, very thick and rigid, above smooth and shining with sulcate midrib, below grayish-green, finely and closely appressed-tomentose, the midrib strong; primary branches of midrib 20 or more pairs, slender but prominent, parallel, slightly curved, arching together very near the entire margin; racemes cylindrical, 12–15 cm. long by 4–5 cm. broad, rather loose; peduncles mostly 2-flowered, 4–6 mm. long, the pedicels 5–8 mm. long; bud 12 mm. long; spur 10 mm. long, terete, slightly tapering, blunt, abruptly curved near the end, the long sepal reflexed after flowering; pubescent middle petal and pubescent stamen, 10–12 mm. long, the lateral petals 8 mm. long; filament not exceeding one-fifth the total stamen length; style cylindrical, slightly thickened above, glabrous; fruit unknown.

Songo, Nov., 1890 (826). According to description of *V. splendens*, Spruce, in Fl. Bras., this is very near that species, and intermediate between it and *V. cismiæfolia*, but the sub-cordate leaves and proportions and dimensions of the floral parts appear to distinguish it.

CARYOPHYLLEÆ.

Cerastium arvense, L. Sp. Pl. 438. Capi, March, 1890 (775). = Rusby 1194.

Alsine media, L. Sp. Pl. 272. (*Stellaria media*, Smith.) Yungas, 1890 (442).

Arenaria lanuginosa (Mx.) Rohrb. in Mart. Fl. Bras. Caryophyll. 274. Yungas 1890 (240). = Rusby 1187 and 1188.

Drymaria cordata (L.) Willd. in R. & S. Syst. Veg. v. 406. Yungas, 1890 (233). = Rusby 1182.

Tissa villosa (Pers.) Britton, Bull. Torr. Bot. Club, xvi. 62. Talca Chugiaguilla, Apr., 1890 (814). = Rusby 1181.

Tissa marina (L.) Britton, Bull, Torr. Bot. Club, xvi. 126. Yungas, 1890 (162).

PORTULACEÆ.

Portulaca pilosa, L. Sp. Pl. 445. Vicinity of La Paz, 10,000 feet, 1889 (57).

Talinum patens (L.) Willd. Sp. Pl. ii. 864. Yungas, 1890 (282).

Calandrinia caulescens, H. B. K. Nov. Gen. vi. 78. Yungas, 1890 (283).

Calandrinia acaulis, H. B. K. Nov. Gen. vi. 78. Songo, Nov., 1890 (917).

HYPERICINEÆ.

Hypericum thesiifolium, H. B. K. Nov. Gen. vi. 192. Talca Chugiaguilla, Apr., 1890 (810). = Rusby 1196 and 1389.

Caopia (*Vismia*) *glabra* (R. & P.) Kuntze, Rev. Gen. Pl. 59. Yungas, 1890 (595 and 621). Songo, Nov., 1890. (835). 595 was distributed as "Monorobia."

Caopia (*Vismia*) *tomentosa* (R. & P.) Kuntze, Rev. Gen. Pl. 59 (?) Yungas, 1890 (683).

Differs materially from the specimens and description of this species, but placed here provisionally.

GUTTIFERÆ.

Tavomita umbellata, Benth. in Mart. Fl. Bras. Guttif. 448. Yungas, 1890 (419).

TERNSTRŒMIACEÆ.

MARCGRAAVIA PEDUNCULARIS, Pœpp. in Herb. Kew, *fide* Britton. Glabrous, stems gray; petioles stout, 0.5–1 cm. long; leaves 6–9 cm. long, 4–6 cm. broad, obovate, the base obtuse or acutish, the apex rounded and often notched, margin entire, somewhat revolute, very thick and coriaceous, light green and somewhat shining above, below of a rich brown (in dried specimens), and exhibiting, parallel with each margin and distant therefrom more than one-third of the distance to the midrib, a row of about a dozen large whitish elevated and punctured glands; corymb terminal, short peduncled; pedicels not, or slightly curved, about 4 cm. long, stout aud somewhat thickened upward, finely striate; flowers globose-obovoid, 8 mm. long and broad, the sepals of a rich brown color, semicircular, with light colored crisped or lacerate margins; bracts sub-pedicelled by a very broad base, 12–20 mm. long, hastate, the expanded basal portions about 1 cm. broad, the saccate portion oblanceolate, obtuse, 3–6 cm. long.

Yungas, 1890 (390).

Mokofua Brasiliensis (Camb.) Kuntze, Rev. Gen. Pl. 63. (*Ternstræmia Brasiliensis*, Camb., in St. Hil. Fl. Bras. Merid. i. 298.) Songo, Nov., 1890 (837). Leaves narrower and base more cuneate than in Rusby's No. 486.

Mokofua congestiflora, (Tr. & Pl.) Kuntze, Rev. Gen. Pl. 63. (*Ternstræmia congestiflora*, Tr. & Pl., Ann. Sci. Nat., Ser. 4, xviii. 259.) Songo, Nov., 1890 (838). = Rusby 617.

Erotium Yungasium (Tul.). (*Freziera Yungasia*, Tul. Ann. Sci. Nat. (III.) viii. 333. Yungas, 1890 (386).

Erotium subintegrifolium, sp. n. Branches elongated, sub-flexuous, reddish-brown, very sparingly hairy, roughish with the prominent lenticels, the internodes marked on either side by a bright red ridge continuous with the margin of the petiole next above; petioles 25–30 mm. long, somewhat more hairy than the branches, strongly margined; leaves 12–16 cm. long, 7–10 cm. broad, ovate-oblong, base rounded, apex very shortly and bluntly acuminate, the margin almost entire and faintly revolute, thickened, rigid, when very young hairy below, but soon perfectly glabrous, the midrib and veins very prominent underneath, the latter numerous and parallel, the alternate ones much fainter; fascicles crowded, 5 to 7-flowered, the pedicels very ehort; flowers nearly 1 cm. long, hermaphrodite; bracts 2, half the length of the sepals, which are cartilaginous, perfectly glabrous, minutely ciliate, oval or nearly reniform; petals similar, ovate, nearly twice the length of the sepals; stamens half the length of the petals, the slender filaments one-half longer than the lance-oblong anthers; pistil about as long as the stamens; ovary 3- or imperfectly 4-celled, twice as long as the style. Stigma oblong.

Yungas, 1890 (496).

Saurauja parviflora, Tr. & Pl. Ann. Sci. Nat. (IV.) xviii. 268. Yungas, 1890 (387).=Rusby 483.

Hæmocharis semiserrata (Camb.) Mart. et Zucc. Nov. Gen. i. 107, t. 66. (*Laplacea semiserrata*, Camb. in St. Hil. Fl. Bras. Mer. i. 300.) Yungas, 1890 (385).=Rusby 485.

MALVACEÆ.

Malveopsis Rusbyi (Britton). (*Malvastrum Rusbyi*, Britton, Bull. Torr. Bot. Club, xvi. 64.) Vicinity of La Paz, 10,000 ft., 1889 (39).

Malveopsis multicaulis (Britton). (*Malvastrum multicaule*, Britton, Bull. Torr. Bot. Club, xvi. 153.) Vic. La Paz, 10,000 ft. (126).

Malvcopsis ——, apparently, but more material needed. Vic. Cochabamba, 1891 (953).

Sida rhombifolia, L. Sp. Pl. 684. Vic. La Paz, 10,000 ft., 1890. (206). Yungas, 1890 (209).

Sida urens, L. Sp. Pl. Ed. 2, 963. Yungas, 1890 (652).

Sida carpinifolia, L. f. Suppl. 307. Vic. La Paz, 10,000 ft., 1890 (476).

Sida ciliaris, L. Sp. Pl. Ed. 2, 961. Vic. Cochabamba, 1891 (934).

Wissadula andina, Britton, Bull. Torr. Bot. Club, xvi, 153. Capi, March, 1890 (768).

Abutilon sylvaticum, K. Schum. Fl. Bras. xii. 3, 418. Capi, March, 1890 (767).=Mandon 821 (*fide* Britton) and Rusby 660.

STERCULIACEÆ.

Melochia venosa, Sw., var. *polystachya* (H. B. K.) Schumann, Fl. Bras. xii. Part 3, 37. Yungas, 1890 (517).

Melochia, sp. n. (?) Appears distinct from all described species, but in the absence of fruit, I cannot certainly determine it. Vic. La Paz, 10,000 ft., 1890 (470).

Chætea hirsuta (R. & P). (*Buettneria hirsuta*, R. & P. Fl. Per. iii. 10). Yungas, 1890 (317).

Ayenia Boliviana, sp. n., Suffruticulose, the crown many headed from a long tap-root, stems numerous, branching, slender, stellate-hispid and slightly ferruginous; stipules slender awl-shaped, 2–3 mm. long; leaves 8–15 mm. long, on petioles half as long, oblong to obovate, acute, coarsely and sharply serrate, the mostly rounded base entire, the midrib and 1 or 2 pairs of nerves very prominent, and like the petioles, calyx, etc., hispidulose; flowers mostly 3 together, the fruiting pedicels at length nearly 1 cm. long; calyx tube cup-shaped, less than 1 mm. long, the lobes 3 mm. long by a little more than 1 mm. broad, triangular with tapering acute apex; filiform claw of petals 7 mm. long, the hood 1.5 mm. long, nearly orbicular in outline; stamen column 2.5 mm. long; style fully equalling the ovary.

Vic. Cochabamba, 1891 (931). Species much resembling in its general appearance some forms of *A. pusilla*, but the distinct mode of venation alone fully distinguishes it.

TILIACEÆ.

Triumfetta semitriloba, L., var. *Martiana*, Schimp. Fl. Bras. xii. Part 3, 135. Yungas, 1890 (465).

Corchorus hirtus, L. Sp. Pl. Ed. 2, 747. Yungas, 1890 (616).

Corchorus pilolobus, Link, Enum. ii. 72. Yungas 1890 (250, 499 and 550).

Vallea stipularis, Mutis in L. f. Suppl. 266. Songo, Nov., 1890. (840). = Rusby 465.

LINEÆ.

Erythroxylon Coca, Lam. Encyc. ii. 393. The finest cultivated form. Yungas, 1890 (268).

ERYTHROXYLON BANGII, sp. n. Plant wholly glabrous, the branches reddish, the younger strongly angled, the joints clothed with several pairs of closely imbricated, rigid, dark brown, triangular-ovate, acute scales, similar to but somewhat broader than the stipules; petioles stout and rigid, 4–7 mm. long, equalling or even twice the length of the stipules; leaves 4–7 cm. long, thick and rigid, drying very brown, especially above, oblong or oval to slightly obovate, the base obtuse to subacute, the apex acute or obtuse, commonly produced into a very short point, midrib prominent underneath, the veins slender, reticulate, margin not revolute; flowers 1 or few in the axils, all parts rigid, on long (2 cm.) pedicels, which are strongly angled and thickened upward into the open-campanulate calyx-tube, which about equals the triangular obtuse lobes, these about 1 mm. long and broad; petals 3–4 mm. long, oblong, obtuse, thick, with stout brown keel and white cartilaginous margins, the crest very prominent and crumpled; stamen tube one-half or more longer than the lobes of the calyx; styles divaricate, one-half longer than the stamens; fruit oblong, obtuse at each end, apparently somewhat 3-angled, blackish in the dried specimens.

Songo, Nov., 1890 (843).

MALPIGHIACEÆ.

Byrsonima crassifolia (L.) H. B. K. Nov. Gen. v. 149. Yungas, 1890 (245).

Heteropteris macrostachya, A. Juss. Monag. Malpigh. 180. Yungas, 1890 (627).

GERANIACEÆ.

Geranium Caroliniamum, L. Sp. Pl. 682. Vic. La Paz, 10,000 ft., 1889 (113).

Geranium sessiliflorum, Cav. Diss. iv. 198, t. 77, f. 2. Capi, March, 1890 (788).

GERANIUM SEPALO-ROSEUM, sp. n. Caudex stout, branching, blackish-brown, clothed with the slender, blackish dead petioles and stipules; branches 1–3 dm. long, ascending or somewhat diffuse, branching, slender, strongly channelled, pilose; radical leaves numerous, the slender petioles 5–8 cm. long, the blade broadly cordate, 2–3 cm. broad, 5-cleft, the divisions mostly 3-lobed, the ultimate lobes entire or bearing 1 or 2 teeth, mostly acute; above somewhat hispid, underneath pilose, none of the hairs retrorse; cauline leaves similar, rather broader and on shorter petioles; stipules pilose, weak, lanceolate, tapering, about 7 mm. long, 3-nerved. Peduncles 1-flowered, nearly 5 cm. long, slender, slightly exceeding the leaves; sepals lance-oblong, 1 cm. long, somewhat rigid, pubescent, the terminal portion bright purple during the flowering period, strongly mucronate; carpels sparingly pilose.
Capi, March, 1890 (784).

Erodium moschatum, L'Her. Hort. Kew, ii. 414. Vic. La Paz, 10,000 ft., 1889 (17).

Erodium cicutarium (L.) L'Her. Hort. Kew, ii. 414. Vic. La Paz, 10,000 ft., 1889 (25).

Tropæolum tuberosum, R. & P. Fl. Per. iii. t. 314. Talca Chugiaguilla, Apr., 1890 (789).

Tropæolum Smithii, D. C. Prod. i. 682. Vic. La Paz, 10,000 ft., 1889 (58). = Rusby 759.

Oxalis corniculata, L. Sp. Pl. 435. Vic. La Paz, 10,000 ft., 1886 (13).

OXALIS YUNGASENSIS, sp. n. Hirsute throughout, or the younger portions tomentose; roots slender, branching, stems numerous, crowded, branching from the base, slightly repent, nerved, leafy; stipules small, partly united with the base of the petiole, ciliate; petioles slender, 2–3 cm. long; leaves ternate, the leaflets cuneate-obcordate, subsessile, 10–13 mm. long and broad, both sides hirsute-tomentose; peduncles axillary, scarcely surpassing the leaves, 1–2 flowered; the bracts subulate, very small; sepals oblong, obtuse, hirsute, 3 mm. long; petals 6–7 mm. long; styles rather stout, pubescent.
Yungas, 1890 (316). = Rusby 753. Near *C. mollis*, Kunth and *C. pubescens*, Kunth.

OXALIS BREVIRAMULOSA, sp. n. Stems creeping, woody, 10–15 cm. long, red, smooth at the base, above villous, bearing crowded, much abbreviated branches upon which the leaves and solitary flowers are crowded; stipules united with the base of the petiole, oblong-oval, membranaceous, pubescent, and like the petiole bright red, 2 mm. long; petiole 5 mm. long, pubescent; leaflets 3, sessile, obreniform, 3 mm. long, faintly punctulate, glabrous; peduncles scarcely 4 mm. long, stout, pubescent, 2-bracted above the middle, the bracts lance-ovate, obtuse, pubescent, 2 mm. long, and like the peduncles green; sepals persistent, oblong-oval, elliptical, about 3 mm. long, white, finely many nerved, pubescent; petals spatulate-obovate, entire, about 8 mm. long; the longer stamens 6 mm. long, exceeding the styles (in the flowering stage) by 1 mm., pubescent; styles glabrous, stigma lobed; pod globose, scarcely exceeding the sepals, deeply 5-lobed, 15-seeded; seeds 1.5 mm. long, flattened, obovate, strongly tuberculate.

Vic. La Paz, 10,000 ft., 1890 (195).

Oxalis ———. Yungas, 1890 (315). Apparently near *O. scandens*, H. B. K., but root, fruit and habit unknown.

ZYGOPHYLLEÆ.

Tribulus maximus, L. Sp. Pl. 386. Vic. Cochabamba, 1891 (927).

Tribulus cistoides, L. Sp. Pl. 387. Vic. Cochabamba, 1891 (962).

RUTACEÆ.

Ruta graveolens, L. Sp. Pl. 383. Talca Chugiaguilla, April, 1890 (813). Escaped.

Zanthoxylum stipitatum, Engler, in Mart. Fl. Bras. xii. Part 2, 161. Vic. Cochabamba, 1891 (922).

Zanthoxylum pubescens, St. Hil. et Tul. Ann. Sci. Nat. Ser. 2, xvii. 141 (?). Yungas, 1890 (462). This species, referred by Engler (Fl. Bras. xii. Part 2, 175) to *Z. rhoifolium*, Lam., as var. *pubescens*, is apparently so excessively variable as to take in this plant, although its leaflets are strongly coriaceous and entirely glabrous, and the common petiole much shorter than called for by the description.

SIMARUBEÆ.

BRUNELLIA BOLIVIANA, Britton, sp. n. Branches very stout, strongly angled, glaucous, above becoming, like the peduncles, etc., hispid-hirsute; leaves, including the petiole, about 3 dm. long, the petiole 4–8 cm. long; leaflets about 6½ pairs, imper-

fectly opposite, slightly petiolulate, the upper larger, 6–10 cm. long, oblong-elliptical, not acuminate, obtuse, the base sub-equal, coriaceous, above shining, below glaucous; principal veins 12–18 pairs, their direction irregular, above sulcate, below prominent; teeth sub-obsolete, tipped with a black callous point; common peduncles 3–5 cm. long, 5 mm. broad, strongly angled; calyx lobes closely applied to the capsules, 5 mm, long, triangular-lanceolate, acute, sparsely hispid; follicles 5, either sessile or stoutly pedicellate, about 15 mm. long, the long beak recurved, densely hispid; seeds one-half the length of the capillary stalks on which they are reflexed, 3.5 mm. long, oblong-ellipsoid, turgid, bright reddish-brown and shining, faintly reticulate.

Yungas, 1890 (664). Very mature specimens of the female plant only seen.

Brunellia Boliviana, Britton (?). Differing in the not glaucous, but ferruginous-tomentellate character of the branchlets, peduncles, lower leaf surfaces and inflorescence; panicles axillary and terminal, lax, 1–2 dm. long including the peduncle, which is 5–8 cm. long, less stout than in the type, angled; flowers 3 mm. broad, the calyx teeth 5, triangular, acute, nearly 2 mm. long and scarcely as broad, grayish brown with white margins. Stamens 10.

Songo, Nov., 1890 (839). Specimens of the male plant, in the young flowering state, only seen. Possibly distinct.

MELIACEÆ.

TRICHILIA OVALIS, sp. n. Branches stout, blackish, velvety; leaves 15–40 cm. long, the common petiole 2–6 cm. long, very thick, about equalling the internodes of the rhachis; leaflets 4–6 pairs, sessile, oval, obtuse at both ends, or the uppermost with contracted base, 6–10 cm. long, 3–4 cm. broad, thick and coriaceous, entire, the margins strongly revolute, above slightly shining, below densely velvety and strongly veined; panicles very compound, lax and broad, pubescent; flowers sessile or short pedicelled; sepals slightly united at the base, less than 1 mm. long, ovate, acutish, pubescent; petals glabrous, narrowly oblong, the apex rounded, 4.5 mm. long; stamen-tube 3 mm. long, the border slightly spreading and shortly 10-lobed, the anthers short and broad, sessile just within the border; pistil a little exceeding the calyx-tube, slenderly conical, flattened, grooved on both sides, bearing a broad peltate stigma.

Songo, Nov., 1890 (848). Distributed as "*Moschoxylon*."

ILICINEÆ.

ILEX BOLIVIANA, Britton, sp. n. Branches gray, branchlets brownish, very leafy, and like the petioles, peduncles, pedicels and calyx, minutely puberulent; petioles 2 mm. long, winged; lamina 3–4 cm. long, 1.5–3 cm. broad, oval, the base rounded or slightly narrowed, the apex with an abrupt, short, very obtuse point, crenate-dentate, coriaceous, green and shining above, white underneath, and sharply dotted with minute black glands, strongly reticulate; racemes compound, loose, 5–10 flowered, the peduncle about 8 mm. long, the pedicels 2 mm. long, at the base bearing 2 minute subulate bracts; flowers diœcious, the staminate only seen, these 4-merous; calyx lobes very short and broad, the apex rounded; petals broader than long; ovary rudimentary, depressed; fruit (collected by Pearce) strongly depressed-globose, 4 mm. broad, lightly 5-grooved. Yungas, 1890 (450). Distributed as "*Máytenus*." (Same as specimen in Herb. Kew, collected by Pearce, Santa Cruz, 6,000 ft., and one collected by Pentland, Bolivia; *fide* Britton.)

ILEX AMYGDALIFOLIA, n. sp. Diœcious, glabrous nearly throughout; branches elongated, blackish-brown; petiole 5–8 mm. long, 2 mm. broad, flattened, black, densely minute-glandular; leaves coriaceous, entire, 8–15 cm. long, lanceolate to oblong, the base rounded and usually somewhat inequilateral, the apex from short-acuminate to tapering, very acute, dark green, the veins underneath prominent and blackish, the midrib lightly sulcate above; umbels lateral, not axillary, approximate, sessile, compound, the branches 5–8, 1 cm. long, the staminate 8–15 flowered, the pistillate fewer, on pedicels 4 mm. long; flowers 4-merous, the calyx teeth triangulate, broader than long, slightly acuminate, acute; petals 2 mm. long, oval, the apex rounded, thickish; in the staminate the filaments stout, two-thirds as long as the petals; the ovary rudimentary but prominent, globose; in the pistillate the stamens prominent, but with imperfect anthers; ovary globose, less than 1 mm. in diameter, 4-grooved, the stigma thick and broad, 4-lobed; fruit (col. Pearce) globose, 5 mm. in diameter, apparently 4-seeded. Songo, Nov., 1890 (842). Collected also by Pearce at Sandillana, 7,000 ft., Herb. Kew, in fruit, *fide* Britton.

RHAMNACEÆ.

RHAMNUS BOLIVIANA, n. sp. Divaricately much branched, the branches grayish-red, the branchlets, peduncles, calyx, etc., ferruginous tomentose; petiole about 1 cm. long, leaf 5–8 cm. long by 1.5–4 cm. broad, oblong to obovate, the base narrowed but not acute, the apex acuminate and acute, finely and sharply

but not closely serrate, rigid, reticulate, tomentose, especially below, where the veins are yellowish; peduncles a little shorter than the petioles, branched, 5–10 or 12-flowered; pedicels 5 mm. long; flowers not seen; fruit obovoid, about equalling the pedicels, dry, hirsute, becoming nearly glabrous, 3-seeded. Yungas, 1890 (351). A single specimen of the same was found among my Bolivian collections, but I was uncertain how it had come there, and rejected it.

Colletia Weddelliana, Miers, Ann. Nat. Hist. Third Ser. V. 207; Wedd. Chlor. And. t. 65. Talca Chugiaguilla, Apr., 1890 (793).

COLLETIA FOLIOSA, sp. n. Branches elongated, slender, all erect, green and sparsely brown-warty, the younger striate and puberulent; stipules distinct, red brown, thick, triangular-subulate and acute, 1.5 mm. long; leaves persistent, thick and rigid, oval to slightly obovate, the base somewhat rounded, the apex perfectly so, or in some slightly notched or mucronulate, midrib very prominent below, the veins somewhat so, finely pubescent on both sides, the blade 8–12 mm. long by one-half as broad, entire, the margins sometimes revolute, the petiole distinct, 1–2 mm. long; pedicels about 3 mm. long, erect or spreading or a few deflexed; flowers 5-merous, the base green and tumid, above yellowish, 4–5 mm. long, campanulate, thickish, the calyx lobes triangular-ovate, obtuse, one-half as long as the tube, erect or recurved; petals about equalling the calyx teeth, distinctly unguiculate, strongly concave, elliptical-spatulate; stamens barely exserted, the filaments stout, twice or thrice the length of the anthers; ovary 1 mm. long, the style stout, 5 mm. long, barely exserted. Vic. Cochabamba, 1891 (978).

AMPELIDEÆ.

Vitis sicioides (L.) Baker, var. *canescens* (Lam.) Baker in Mart. Pl. Bras. xiv. Part 2, 202. Yungas, 1890 (321).

Vitis trifoliata (L.) Baker in Mart. Fl. Bras. xiv. Part 2, 212. Yungas, 1890 (347).

SAPINDACEÆ.

Cardiospermum Halicacabum, L. Sp. Pl. 925. Vic. Cochabamba, 1891 (987).

Serjania dumicola, Radlk. Conspectus Serjaniæ, p. 4, sp. no. 8. Yungas, 1890 (421).

Serjania reticulata, Camb., forma *genuina*, Radlk. Determined by Prof. Radlkofer. Yungas, 1890 (413).

Serjania ———. Very near 413, but distinct and apparently undescribed, but without fruit. Vic. Cochabamba, 1890 (879).

Schmidelia ———. Yungas, 1890 (672). Specimen unfit for determination.

Dodonæa viscosa, L. Mant. 238. Yungas, 1890 (372).

ANACARDIACEÆ.

Schinus mollis, L. Sp. Pl. 388. Capi, March, 1890 (770 and 771).

Duvaua dependens (Ort.) D. C. Prodr. ii. 74. Vic. La Paz, 10,000 ft., 1890 (160).

Duvaua dependens (Ort.) D. C. (?). Songo, Nov., 1890 (895).

Duvaua dependens. var. *subintegra*, Engler, in Mart. Fl. Bras. xii. Part 2, 387, t. 81. f. 1. Vic. Cochabamba, 1891 (981).

LEGUMINOSÆ.

Crotalaria Pohliana, Benth. Ann. Nat. Hist. iii. 428. Yungas, 1890 (580).

Crotalaria anagyroides, H. B. K. Nov. Gen. vi. 404. Yungas, 1890 (309).

Crotalaria ———. Species probably undescribed, but material too poor. Vic. La Paz, 10,000 ft. (427, in part).

Lupinus Bogotensis, Benth. Pl. Hartweg. 168. Vic. La Paz, 10,000 ft., 1889 (88). = Rusby 954.

Lupinus Bangii, sp. n. Perennial from a stout, elongated, vertical root, herbaceous, branched from the base, the stem at first erect, afterward reclining and becoming naked below, stout, 2–3 dm. long, below sparingly, above densely coarse-hairy, conspicuously ribbed; raceme dense in flower and fruit, 8–12 cm. long, lance-oblong, obtuse; stipules subulate, acute, 8 mm. long, clothed with long, coarse silky hairs; petioles slender, the lower erect, 5 cm. long, the upper spreading and shorter; leaflets mostly 7, linear-oblanceolate, 1–2 cm. long, 2–4 mm. wide, the base gradually tapering, the apex with a slight acumination, sericeous on both sides; inflorescence densely coarse-silky; pedicels stout, 3 mm. long, elongating but little in fruit, the flowers nearly 1 cm. long, blue; pods broadly oblong and much compressed, 2.5 cm. long (exclusive of the strongly deflexed yellow style, which is 5 mm. long), densely hairy, 5–6-seeded; fruiting calyx-lobes thin, nearly smooth, 7 mm. long; bracteoles half as long, and, like the pod, densely hairy; seeds strongly flattened, dark brown, dull, 3.5 mm. long, 2 mm. broad.

Vic. La Paz, 10,000 ft., 1890 (737). = Mandon's 688.

Spartium junceum, L. Sp. Pl. 708. Near La Paz, 10,000 ft., 1889 (43).

Medicago denticulata, Willd. Sp. Pl. iii. 1414. Near La Paz, 10,000 ft., 1890 (189).

Medicago lupulina, L. Sp. Pl. 779. Near La Paz, 10,000 ft., 1890 (142).

Medicago sativa, L. Sp. Pl. 778. Near La Paz, 10,000 ft., 1889 (45). Escaped.

Melilotus Indica (L.) All. Fl. Ped. i. 308. Near La Paz, 10,000 ft., 1889 (72). Near Cochabamba, 1891 (887).

Melilotus alba, Desv. in Lam. Encycl. iv. 63. Near La Paz, 10,000 ft., 1889 (118).

Trifolium amabile, H. B. K. Nov. Gen. vi. 503. Near La Paz, 10,000 ft., 1890 (191).=Rusby 1012, etc.

Psoralea Mutisii, H. B. K. Nov. Gen. vi. 487. Near La Paz, 10,000 ft., 1890 (158).=Rusby 957.

Dalea Boliviana, Britton, Bull. Torr. Bot. Club, xvi. 259. Near La Paz, 10,000 ft., 1889 (106).=Rusby 959.

DALEA PAZENSIS, sp. n. Suffruticose, 5–8 dm. high, erect, much branched, the long and slender branches erect, slightly pubescent, more so above; stipules nearly filiform from a triangular base, 1–4 mm. long; leaflets 6–10 pairs, oblong, 6–9 mm. long, 2.5 mm. broad, cuspidate, thickish, puberulent, the petiolule less than 1 mm. long, the rhachis filiform, stiff and persistent; spike triangular-ovate, obtuse, 2.5 cm. long; bracts oblong, scarious with a broad dark midrib, pubescent, 5 mm. long, exclusive of the abrupt, filiform, very pilose point, which is nearly 3 mm. long; calyx 4 mm. long, strongly 10-nerved. densely villous, the teeth one-third as long as the tube; corolla blue, apparently nearly twice the length of the calyx.

Near La Paz, 10,000 ft., 1890 (678). Near *D. Boliviana*, Britton, but differing in the stipules, the number, form and surface of the leaflets and the length and abruptness of the acumination of the bracts. Specimens very imperfect.

Indigofera Anil, L. Mant. 293. Yungas, 1890 (246).

CRACCA LEPTOSTACHYA (D. C.) (*Tephrosia leptostachya*, D. C. Prodr. ii. 251). Yungas, 1890 (651). = Rusby 1343.

Astragalus unifultus, Wedd. Chlor. And. 260 (ex. descr.). Near La Paz, 10,000 ft., 1890 (168).

ASTRAGALUS MANDONI, sp. n. Stems numerous from a woody base, 1 dm. high, blooming while erect, soon decumbent, becoming 4–5 dm. long, slender, at length scantily leafy, very finely and softly pubescent; stipules triangular, acute, villous, 6 mm. long, closely sheathing; leaves 6–8 cm. long, exclusive of the petioles which are 3 cm. long; leaflets about 12 pairs, irregularly placed, slightly petiolulate, oblong or very slightly lanceolate, 10–16 mm. long by one-third as broad, both base and apex varying with age from acutish to rounded, or the apex slightly notched, villous underneath, roughish above; peduncles slender, about 7 mm. long; racemes capitate to short-oblong, dense, 2–3 cm. long and broad; bracts 4–5 mm. long, triangular-ovate, tapering and acute; flowers nearly 2 cm. long, deep blue, calyx tube nearly cylindrical, 6 mm. long, 3 mm. broad, deep green, about 20-nerved, the teeth 3–4 mm. long, narrowly subulate, dark colored, densely pubescent.

Near snow line, Mt. Tunari, 1891 (1022). The same as Mandon's 709 from near Sorata.

ASTRAGALUS SINOCARPUS, sp. n. Suffruticose, 1–2 dm. high, much branched, the branches stout, ascending or erect, terete below, above strongly angled, puberulent, internodes 1 cm. long, nodes invested by the broad, semi-scarious, pubescent, acuminate stipules, which are nearly as long as the internodes; leaves about 7 cm. long, on rather stout, channelled petioles 4–5 cm. long; leaflets about 12 pairs, sessile, 12 mm. long and half as broad, oval to slightly ovate, or the terminal slightly obovate, rounded or slightly notched at the apex, green, underneath densely, above more sparsely pilose; racemes axillary, dense, capitate, in flower 1.5 cm. long, 1 cm. broad, in fruit 2.5 cm. long and broad, on slender peduncles 2–3 cm. long, the latter in fruit deflexed and again ascending; flowers about 1 cm. long, the corolla exceeding the calyx by half; corolla apparently whitish, the calyx teeth blackish; pods 1.5 cm. long, lanceolate, upwardly falcate, tapering to a sharp stiff point, the 2 cells separated, either by a narrow sinus, or broadly divergent.

Near La Paz, 10,000 ft., 1890 (174). According to Dr. Britton, the same as Mandon's 710.

ASTRAGALUS COLLICULUS, sp. n. From a very long, stout, woody tap-root, densely tufted to form little hillocks, the branchlets very stout, 1–2 cm. long, the foliage and flowers mostly crowded at their ends; united stipules nearly semi-circular, the apex rounded, sheathing, slightly cartilaginous, yellowish, glabrous and somewhat shining, 5 mm. long; leaves 5–10 mm. long, on petioles of nearly or quite the same length, the latter broad and stiff, at the base dilated and sheathing; leaflets

about 9 pairs, closely approximate or imbricated, in a few leaves at length becoming 1.5 to 2.5 mm. long, nearly orbicular, thick, both sides densely silky; flowers large and broadly expanded, solitary or 2 together, sessile in the axils; bracts elliptical, in texture and surface similar to the stipules, about 3 mm. long and half as broad; upon the upper side of the calyx is a very hairy bristle-shaped bractlet, about as long as the bract; calyx tube 3.5 mm. long, and two-thirds as broad, densely villous, the teeth triangular, acute, 1.5 mm. long, 1 mm. broad; corolla deep blue, the standard nearly 1 cm. long and broad; ovary lanceolate with short thick style, densely silky.

Near La Paz, 10,000 ft. (Incorrectly labelled Yungas) 1890 (660). Dr. Britton, who compared these specimens at Kew, considers them distinct from any there named, but identical with Mandon's 711 and 712, from the Bolivian Andes. Apparently the species is a very variable one. Mr. Bang's 660 includes 2 distinct forms, and both are quite different from Mandon's 712. The other form of Mr. Bang's collection is less stout and compact, has the leaflets only 6 pairs on longer, more slender petioles, and they are less hairy, distinctly obcordate. Mandon's plant (712) is more rosulate and densely white tomentose, with smaller flowers.

Astragalus ———. Collected with the last, and as a part of it, but evidently distinct. Material insufficient for a diagnosis. Vic. La Paz, 10,000 ft., 1890 (660 a).

Amicia Lobbiana, Benth. (As I cannot find that this species has been published, a description is here appended.) Suffruticose, widely branching and reclining, the branches very flexuous, and like the petioles, etc., densely pubescent; petioles stoutish, 1.5–3 cm. long; leaflets 2 pairs, the intervening rhachis about one-third as long as the petiole, the leaflets slightly petiolulate, 1–2.5 cm. long and broad, triangular-obovate, obcordate by a broad sinus, above dark green, glabrous, finely whitish-pinnate-veined, below very pale or slightly ferruginous, the margins and veins pubescent, very finely reticulate; peduncles 1–several-flowered, the bracts (purplish?) mostly unequally reniform, flabellinerved, 1–1.5 cm. broad; pedicels slender, spreading, the flowers ascending or erect; flowers at length 4 or 5 cm. long, the black glandular calyx half as long as the lilac-purple corolla, which is pubescent and falcate; pods not seen.

Yungas, 1890 (694). = Mandon 765, and Rusby 1333. The

plant grows luxuriantly along roadsides, in hedges and upon the borders of forests or copses.

PATAGONIUM MIRAFLORENSIS (Remy) (*Adesmia miraflorensis*, Remy, Ann. Sci. Ser. III. vi. 357) ex descr. Vic. La Paz, 10,000 ft., 1889 (69). = Rusby 1039 and 1041.

Stylosanthes hamata (L.) Taubert, Abhand. Bot. Verein. Branden. Pl. 32, f. 22. (?) Vic. Cochabamba, 1891 (936).

Zornia diphylla, Pers. var. *latifolia* (D. C.) Benth. in Mart. Fl. Bras. xv. Part I. 81. Yungas, 1890 (416). A nearly glabrous form. Vic. Cochabamba, 1891 (964).

Meibomia adscendens (Sw.) Kuntze, Rev. Gen. Pl. 19 (*Desmodium adscendens*, D. C. Prod. ii. 332). Yungas, 1890 (408). = Rusby 977.

Meibomia supina (Sw.) Britton, Ann. N. Y. Acad. Sci. vii. (*Desmodium incanum*, D. C. Prod. ii. 332). Yungas, 1890 (424).

Meibomia uncinata (Jacq.) Kuntze, Rev. Gen. Pl. 197. (*Desmodium uncinatum*, D. C. Prod. li. 331). Yungas, 1890 (257).

Meibomia pachyrhiza (Vogel) Kuntze, Rev. Gen. Pl. 197. *Desmodium pachyrhizum*, Vogel, Linnæa, xii. 97) ex deser. Yungas, 1890 (649).

MEIBOMIA ANDINA, sp. n. Stem prostrate, slender from a woody base, scantily pilose with spreading hairs, finely many-nerved, purple, internodes about 4 cm. long; stipules spreading, purplish, finely nerved, rigid, triangular and regularly tapering to a very acute point, a little more than 1 cm. long, the base 3 mm. broad; stipellæ small, bristle-shaped; petioles hirsute, about equalling the internodes, the petiolules densely hairy; lateral leaflets spreading or deflexed, on very short petiolules, distant 5–8 mm. from the terminal, ovate, slightly inequilateral, the base rounded, slightly apiculate, 2.5–3.5 cm. long and nearly half as broad; the terminal one-half larger, rhombic-oval, the base somewhat cuneate, the apex blunt; upper surface scabrous with scattered, conspicuous white points, the lower pubescent with stiff, stout, slightly ferruginous hairs; bracts rigid, ovate, acutely tapering, very strongly and sharply nerved; panicles small, very loose; pedicels nearly as long as the buds; calyx teeth linear-subulate, exceeding the ellipsoid tube; flowers not seen; joints of fruit nearly elliptical, 8 mm. long by 5 broad, strongly deflexed upon the broad stipe, which is 5 mm. long.

Yungas, 1890 (650). Resembles *M. albiflora*.

Cruminium Virginianum (L.) Britton, Bull. Torr. Bot. Club, xviii. 269. (*Centrosema Virginiana*, Benth., Ann. Mus. Vind. ii. 120.) Yungas, 1890 (356).

Cologania ovalifolia, H. B. K. Nov. Gen. vi. 412. Vic. Cochabamba, 1891 (984).

Terammus uncinatus (L.) Sw. Fl. Ind. Occ. iii. 1238. Yungas, 1890 (359). Differs from Rusby's 1346 in the thicker, oblong elliptical leaves, velvety on both sides.

Erythrina Crista-galla, L. Mant. 99. Songo, Nov., 1890 (822).

Galactia speciosa (D. C.) Britton, Bull. Torr. Bot. Club, xvi. 262. Yungas, 1890 (343) = Rusby 1341.

Dioclea lasiophylla, Mart. Ann. Mus. Vind. ii. 134. Yungas, 1890 (472). = Blanchet 1162, *fide* Britton.

DIOCLEA CORIACEA (Grah.) (*Dolichos coriaceus*, Grah., Wall. Cat. = *Dioclea reflexa*, Hook. f. Nig. Fl. 306.) Yungas, 1890 (547).

Canavalia villosa, Benth. Ann. Mus. Vind. ii. 135. Yungas, 1890 (586). A form with large thick glabrate leaves, and very tomentose calyx.

Eriosema rufa (H. B. K.) E. Meyer, Comm. Pl. Af. Austr. 128. Yungas, 1890 (426).

Eriosema crinita (H. B. K.) E. Meyer, Comm. Pl. Af. Austr. 128. Yungas, 1890 (427 in part—may be called 427 a.).

Eriosema simplicifolia (H. B. K.) Walp. Rep. ii. 902. Yungas, 1890 (428).

Cæsalpinia pectinata, Cav. in D. C. Cat. Hort. Monspel. 84. Songo, Nov., 1890 (824).

CÆSALPINIA (*Hoffmannseggia*) BANGII, sp. n. Shrub, habit unknown, the stout branches and petioles bearing dark brown subulate glands; common petiole 1–2 cm. long, the secondary very short; primary pinnæ 4 or 5 pairs, about 3 cm. long; ultimate leaflets 7–10 pairs, on stout, black, nodiform petiolules, coriaceous, glabrous, pale, elliptical, the base slightly cordate, the apex rounded or slightly emarginate, 6–8 mm. long, 5 mm. broad; raceme terminal, dense, very coarse and thick, spike-like, sessile or on a very short peduncle; pedicels short, stout; calyx reddish-brown, black-glandular, much imbricated, the lobes coriaceous, 1 cm. long, beautifully and strongly fringed; corolla one-half longer than the calyx, sub-coriaceous, glabrous; filaments densely pilose; ovary tomentulose; pods broadly oblong, slightly falcate, abruptly short acuminate;

seeds about 3, compressed, nearly orbicular or somewhat broader above, purple brown, very smooth and shining.

Bolivian plateau, 1891 (757).

CÆSALPINIA (*Hoffmannseggia*) FISHERIANA, sp. n. Shrub with lax, angulate, brown branches which, like the petioles, peduncles and calyx, are densely black-glandular; common petioles 2–3 cm. long; primary leaf divisions about 3 pairs, 1.5 cm. long, exclusive of the slender petiolules, which are about 5 mm.; ultimate leaflets about 7 pairs, the lower very slightly petiolulate, coriaceous, oblong or slightly oblanceolate, the base truncate, the apex rounded, the margin with a narrow bright red border, crenate, a black gland in each sinus, about 5 mm. long and half as broad; racemes pedunculate, several-flowered, lax; pedicels about 1 cm. long, slender; calyx much imbricated, sepals oblong-lanceolate, reddish with broad light colored margins, about 6 mm. long, the petals nearly one-half longer; pod broadly oblong, slightly incurved, with a recurved, abrupt, acutely tapering point, densely beset with longish tapering glands.

Bolivian plateau, 1891. (756, in part, perhaps distributed as 756 a.)

CÆSALPINIA (*Hoffmannseggia*) ROSULATA, sp. n. Stems stout, deep purple, glabrous, apparently prostrate with short, stout, erect branches, bearing the foliage and inflorescence crowded at their summits; petioles slender, 5–8 mm. long; primary leaf divisions only 1 or 2 pairs, on petiolules about 5 mm. long; ultimate leaflets about 5 pairs, thickish, scarcely petiolulate, oblong, inequilateral and slightly upwardly curved, rounded at both ends, entire or crenulate; racemes on long, slender, crooked branches, peduncled, loosely several-flowered; peduncles slender and weak, 5–6 mm. long, and like the calyx very minutely downy; otherwise the flowers very similar to those of the last; pods slightly narrower than in the last, a little smaller, the more slender point continuing the curve of the pod, the sutures thickened, the surface beset with short, stout, black glands; seed much flattened, quadrangulate, greenish brown, dull.

Bolivian plateau, 1891 (756, in part).

All these *Cæsalpinias* would be placed in *Hoffmannseggia* were the latter maintained distinct. Their intermediate character justifies the consolidation of the two genera as has been proposed.

Cassia affinis, Benth. in Mart. Fl. Bras. xv. Part 2, 98. Yungas, 1890 (464). = Rusby 837.

Cassia tomentosa, L. f. Suppl. 231. Near La Paz, 10,000 ft., 1889 (49). = Rusby 981.

Cassia latiopetiolata, Domb.; Vogel Syn. Cass. 70. Vic. La Paz, 10,000 ft. 1889 (24). = Rusby 980.

Cassia Chamæcrista, L. Sp. Pl. 538. Yungas, 1890 (549). = Rusby 2854.

Cassia flavicoma, H. B. K. Nov. Gen. vi. 366. Yungas, 1890 (613). = Rusby 1021.

Prosopis juliflora (Sw.) D. C. Prod. ii. 447. Songo, Nov., 1890 (823).

Mimosa Boliviana, Benth. Trans. Linn. Soc. xxx. 396. Yungas, 1890 (392). Incorrectly labelled "Vic. La Paz, 10,000 ft." = Rusby 1300.

Acacia Farnesiana (L.) Willd. Sp. Pl. iv. 1083. Songo, Nov., 1890 (864).

Piptadenia communis, Benth. Hook. Journ. Bot. iv. 337. Vic. Cochabamba, 1891 (921).

PITHECOLOBIUM LAXIFLORUM, sp. n. Habit unknown, glabrous throughout, the branchlets slightly warty; stipules deciduous, not seen; common petioles stout, 2 cm. long, strongly nerved; leaves geminate, the secondary petioles equalling and similar to the primary; primary divisions of the leaf about 2 dm. long, including their petioles; ultimate leaflets 4–5 pairs, nearly sessile, dark brown at the point of insertion, the lowest 5 cm. long by half as broad, the uppermost 9 cm. long by 4 cm. wide, all oval, obtuse at both ends, minutely cuspidate, coriaceous, prominently veiny underneath; peduncles slender, 3–4 cm. long, the spikes loose, cylindrical, 12–18 cm. long; flowers crimson; calyx minute, deeply toothed; corolla-tube cylindrical or slightly funnel form, 7 mm. long by 2 mm. broad; stamens very numerous, the length of the exserted portion slightly greater than that of the corolla-tube; fruit not seen. Yungas, 1890 (625).

Inga edulis, Mart. Herb. Fl. Bras. 113. Yungas, 1890 (236). = Rusby 995.

ROSACEÆ.

PRUNUS BRITTONIANA, sp. n. Tree (?) glabrous throughout, the branches slender, blackish; petioles a little more than 1 cm. long, 2–3 mm. broad, broadly channelled; leaves very coriaceous, ovate, the base rounded but abruptly somewhat narrowed into the petiole, the apex acutish, at least in the younger leaves

(apex broken off in all the older leaves of my specimen) the midrib strongly channelled above, prominent below, the veins prominent and strongly reticulated below; margin bearing rather distant, small, sharp, salient teeth; blade 1–2 dm. long or perhaps longer; racemes simple, solitary in the axils, sessile, variable in length, but about as long as the leaves, rather loosely flowered; pedicels about 5 mm. long, divaricate; calyx-tube 3 mm. long, the triangular lobes 1 mm. long, obtusish; petals orbicular, 2.5 mm. long; style very thick, 2 mm. long, the stigma broad; fruit (mature ?) nearly spherical, with a small stout point, 12 mm. long.

Songo, Nov. 1890 (821). = Mandon 677.

Kageneckia lanceolata, R. & P. Fl. Per. Syst. 290. Talca Chugiaguilla, Apr. 1890 (797).= Mandon 676.

Rubus Bogotensis, H. B. K. Nov. Gen. iv. 158. Yungas, 1890 (684).

Alchemilla tripartita, R. & P. Fl. Per. i. 68. Vic. Cochabamba, 1891 (886).

Alchemilla pinnata, R. & P. Fl. Per. i. 69. Vic. La Paz, 10,000 ft. 1890. (76, 659 and 660 b, the last, perhaps, distributed as a part of 660.)

MARGYRICARPUS CRISTATUS, Britton, sp. n. Spiny shrub, with very rough scaly bark, the branches numerous, stout, erect, when young whitish, becoming blackish, the joints crowded; spines simple, 1.5–2.5 cm. long, spreading and more or less recurved, whitish, pungent, terete above, below flattened and the base dilated to 3 mm. broad, hoary with tightly appressed hairs, their leaflets apparently entirely obsolete; fascicled leaves linear, blunt, rigid, revolute, keeled, 5–8 mm. long; flowers 4-or 5-merous, the calyx tube about 5 mm. long, purple, sharply winged, the wings crenate; teeth at length spreading or reflexed, 1.5 mm. long, spatulate-oblong, indistinctly nerved.

La Paz; 1890 (170). = Mandon 693.

Polylepis villosa, H. B. K. Nov. Gen. vi. 228. Capi, March, 1890 (769).=Mandon 674.

Poterium Sanguisorba, L. Sp. Pl. 994. Vic. La Paz, 10,000 ft. 1889 (110).

SAXIFRAGEÆ.

ESCALLONIA MANDON, sp. n. Glabrous, the branches reddish, the younger irregularly angled and slightly winged; leaves subsessile, oblanceolate, acute or obtuse, gradually tapering to the base, slightly revolute, minutely serrulate, underneath pale

with the dark veins prominently reticulate, 2.5–4 cm. long; panicles leafy at the base, oblong-pyramidal, 2 or 3 cm. long and broad; bracts linear, acute, peduncles and pedicels sharply wing-angled, the latter 1–2 mm. long; calyx-tube 2 mm. high, 5 mm. broad, the teeth small, triangulate, obtuse; petals thick, white, with prominent dark, branching veins, spatulate, obtuse, the base truncate, 6 mm. long; filaments and style 2 mm. long, Capi, March 1890. (780).=Mandon 602.

Windmannia fagaroides (H. B. K.) Kuntze, Rev. Gen. Pl. 228. (*Weinmannia fagaroides* H. B. K. Nov. Gen. vi. 54.) Yungas, 1890 (669.)

Windmannia elliptica (H. B. K.) Kuntze, Rev. Gen. Pl. 228. Yungas, 1890 (311).

WINDMANNIA BANGII, sp. n. Branches red-brown, sparsely ferruginous-hairy, the younger portions more so; branchlets opposite, slender, ribbed, the internodes 5–7 cm. long; petioles stout, about 1 cm. long, mostly reflexed, and like the under surfaces of the leaves, peduncles, etc., sparsely hispidulous-pubescent; leaves simple, 5–9 cm. long, 3–5 cm. broad, ovate, the base rounded or subcordate, the apex somewhat acuminate, acute or obtusish, closely serrate-dentate, the teeth acute or obtuse, slightly coriaceous, above glabrous and slightly shining, the veins imperfectly opposite, 10–15 pairs, crooked and bifurcating, rather prominent; racemes cylindrical, lax, 4–8 cm. long, barely 1 cm. broad, on peduncles about 2 cm. long, the flowers mostly 3 together (or apparently 6 by the confluence of two fascicles); bracts brown, weak, subulate, about 1.5 mm. long; pedicels slender, 2.5 mm. long; flowers about 2 mm. broad; sepals 5, triangular-ovate, 1.5 mm. long, acutish, ciliolate; stamens about twice, and pistils about thrice the length of the sepals; fruit not seen, but sepals manifesting a tendency to persist.

Yungas, 1890 (666).

Ribes glandulosum, R. & P. Fl. Per. t. 233, Fig. 6. Songo, Nov. 1890 (865).=Mandon 600.

RIBES PENTLANDI, Britton, sp. n. Leaves obovate-orbicular, obtuse or acutish at the apex, narrowed or cuneate at the base, firm and somewhat coriaceous, strongly 3-nerved at the base, obtusely 3–5-lobed, crenulate-serrulate or rarely nearly entire, very resinous, dark green and shining above, paler beneath, 1.5–2.5 cm. long, petioles glandular-pubescent, 4–6 mm. long; flowers in short axillary racemes; bracts oblong-linear, 3 mm. long, persistent; calyx pubescent without, its lobes short, obtuse; berry globose, glabrous, about 4 mm. in diameter.

Talca Chugiaguilla, Apr., 1890 (798). Peru (MeLean); San. Meto (Peru?) (Matthews); Bolivia (Pentland). All in Herb. Kew.

CRASSULACEÆ.

Cotyledon Peruviana, Baker, Ref. Bot. No. 10. Vic. La Paz, 10,000 ft., 1890 (148).

DROSERACEÆ.

Drosera ———, without flowers or fruit; near *D. pusilla* H. B. K. but apparently distinct. Yungas, 1890 (337).

HALORAGEÆ.

Myriophyllum Titicacense, Remy, Analect. Boliv. Lake Titicaca, 1890 (163).

MYRTACEÆ.

Psidium pomiferum, L. Sp. Pl. Ed. 2, 672. Yungas, 1890 (253).

Psidium pyriferum, L. Sp. Pl. Ed. 2, 672. Yungas, 1890. (287 a, Perhaps distributed as a part of 287).

PSIDIUM OÖIDEUM, Berg. var. LONGIPEDUNCULATUM, n. var. Younger portions of stem, petioles, peduncles and lower sides of leaves more densely velvety than the type; leaves elliptical, the base rounded, the peduncles and pedicels 3–5 cm. long, the calyx tube more tumid in the bud; fruit not seen. Yungas, 1890 (287).

Myrcia lanceolata, Camb. in St. Hil. Flor. Bras. Merid., ii. 236. Yungas, 1890 (285).

Myrcia Paivæ, Berg. in Mart. Fl. Bras. xiv. Part 1, 179. Yungas, 1890 (220 and 360).

Myrcia phæoclada, Berg. in Mart. Fl. Bras. xiv. Part 1, 167. Songo, Nov. 1890 (830).

MYRCIA (AULOMYRCIA) YUNGASENSIS, sp. n. Glabrous, the branchlets minutely striate, densely leafy; leaves 3–5 cm. long, 2–3 cm. broad, obovate, the apex rounded or in some very slightly acuminate, but blunt, the base cuneate into a margined petiole 3–5 mm. long, coriaceous, the margin revolute, shining both sides, paler below, punctate but not pellucid, midrib and veins prominent both sides; inflorescence scanty, the peduncles axillary, 3–4 cm. long, nearly twice the length of the loosely few-flowered panicle; bracts narrowly oblong, obtuse, pale, 3 mm. long; bud broadly obconical or top-shaped; pedicels 5–8 mm. long, slender; flowers 5 mm. broad; sepals 5, nearly semicircular, the larger 2 mm., the smaller scarcely 1 mm. broad;

petals ovate-semi-circular, 2–3 mm. broad; ovary small, depressed, smooth and shining; style slender, tapering, 5 mm. long.

Yungas, 1890 (293).

EUGENIA BOLIVIENSIS, sp. n. Branchlets somewhat 4-angled and, like the petioles, under sides of the leaves and inflorescence, densely ferruginous with short hairs; petioles scarcely longer than broad; leaves thick and rigid, 1–2 dm. long, 4–7 cm. broad, lanceolate, the base slightly acute, the apex acuminate, strongly and finely reticulate, above pale and shining with the midrib deeply and narrowly sulcate, the principal veins depressed, the smaller ones broad and elevated, yet sulcate, underneath the midrib and all the veins strong and prominent, the primary connected at their ends to form a strong recurved margin; inflorescence subterminal, paniculate, ample, rather lax; flowers sub-sessile; buds depressed-globose; calyx 5 or 6 mm. broad, the lobes sub-semicircular; petals 2–3 mm. long and somewhat broader, rounded.

Songo, Nov. 1890 (825).

MELASTOMACEÆ.

Tibouchina stenopetala, Cogn. in D. C. Mon. Phan. vii. 262. Yungas, 1890 (430).

Tibouchina Orbignyana, Cogn. in D. C. Mon. Phan, vii. 261. Yungas, 1890 (681). Distributed as "Aciotis."

Brachyotum microdon (Naud.) Triana, Melast. 49. Yungas, 1890 (695). = Rusby 2340.

Meriania Boliviensis, Cogn. Bull. Torr. Bot. Club, xvii. 58. Yungas, 1890 (288). = Rusby 2246.

Graffenrieda emarginata (R. & P.) Triana, Melast. 71. Songo, Nov. 1890 (849). = Rusby 2335. Perhaps distributed as *Miconia*.

GRAFFENRIEDA BOLIVIENSIS, Cogn. sp. n. (Description by M. Cogniaux.) Foliis breviuscule petiolatis, coriaceis, elliptico-oblongis, sub-abrupte et obtusiuscule apiculatis, lati rotundatis vel vix emarginatis, trinerviis, nervis lateralibus marginii proximis; floribus 5-meris, breviter pedicellatis, sub-fasciculatis; calycis limbo primum clauso demum in lobos 2–3 irregularis rupto, tubo teretiusculo.

Rami juniores vix furfuraceæ dein glaberrimi, validi, superni obscure tetragoni et satis compressi. Petiolus robustissimus, leviter furfuraceus, 2.5–3 cm. longus. Folia utrinque glaberrima, siccitate pallide viridia, 28 cm. longa, 14–18 cm. lata,

nervulis transversalibus numerosis rectis, subtus valde prominentibus. Paniculæ late pyramidatæ, satis multifloræ, 2–3 dm. longæ, pedunculus communis glaber, robustus basi longe simplex; rami oppositi sæpius geminati, patuli, elongati, superne leviter ramulosi; pedicelli 4–5 mm. longi. Calyx dense furfuraceus, tubo oblongo campanulato, 6 mm. longo, lobis 5–6 mm. longis. Petala oblique obovata, 7–8 mm. longa. Ovarium 5-loculare; stylus 1 cm. longus. Capsula ovoideo-subglobosa, 9 mm. crassa.—Affinis *G. limbatæ*, Triana; Cogn. in D. C. Monogr. Phan. vii. 440.

Songo, Nov. 1890 (832).

Leandra dichotoma, (Don) Cogn. in Mart. Fl. Bras. xiv. part 4, 200.

Yungas, 1890 (525). = Rusby 2235.

Leandra crenata, (Don) Cogn. in Mart. Fl. Bras. xiv. part 4, 137.

Yungas, 1890 (277). Not the same as Rusby's 2306. Distributed as *Miconia*.

Leandra Carassana, (D. C.) Cogn., var. *Estrellensis* (Raddi) Cogn. in Mart. Fl. Bras. xiv. part 4, 120, ex. descr. Yungas, 1890 (314). = Rusby 2306 and 2307, these having been enumerated as *L. crenata*.

LEANDRA BOLIVIENSIS, Cogn. sp. nov. (sect. Chaetodon). (Description by M. Cogniaux.) Ramis junioribus petiolis pedunculisque breviter denseque villoso-tomentosis; foliis disparibus, majusculis, longiuscule petiolatis, membranaceis, oblongis, breviter acuminatis, basi obtusis vel rotundatis, margine minute denticulatis ciliatisque, 5-nerviis, sub-5-plinerviis, supra ad nervos densiuscule villosis, caeteris glabris, subtus brevissime stellato-puberulis praecipue ad nervos; paniculis terminalibus vel subterminalibus, parvis, diffusis, paucifloris; floribus sessilibus, bracteolatis, glomerulatis; calyce leviter puberulo et breviuscule sparseque hirsuto, dentibus exterioribus minutis; ovario glabro. Rami graciles, obscure tetragoni, cinerei. Petiolus 1–3.5 cm. longus. Folia majora 10–13 cm. longa ob 3.5–5 cm. lata, minora dimidio breviora et angustiora. Paniculæ 3–4 cm. longæ; glomeruli 2–4 flori. Calycis tubus ovoideo-campanulatus, 2 mm. longus latusque; dentes vix .5 mm. longi. Petala late triangularia, breviter acuminata, 2 mm. longa. Antheræ oblongæ, 1 mm. longæ, connectivo basi producto, postice minute calcarato. Stylus vix 2 mm. longus, stigmate punctiformi. Species *L. debilis*, Cogn. (l. c. p. 674) plus minusve proxima sed valde diversa.

Yungas, 1890 (514). Distributed as *Miconia*.

Miconia albicans, (Sw.) Triana, Melast. 116. Yungas, 1890 (431).

Miconia annulata (Naud.) Tri. Melast. 121. Yungas, 1890 (318). = Rusby 2272, 2285 and 2295.

Miconia ———, sp. apparently near *M. gonoclada*, Tri., but with only young buds. Yungas, 1890 (350).

Miconia eriodonta, D. C., Prod. iii. 185. Yungas, 1890 (492).

Miconia gramulosa, Naud. Melast. 910, *fide* Cogniaux, but it is not glabrous above, and exactly equals Rusby's 2263 which M. Cogniaux thought to be undescribed. Yungas, 1890 (596).

Miconia hygrophila, Naud. Melast. 220, *fide* Cogniaux. Yungas, 1890 (722).

Miconia livida, Tri. Trans. Linn. Soc. xxviii. 121. Yungas, 1890. (552).

Miconia ———. In bud only and not to be determined, but perhaps not *M. rubiginosa*, for which it was distributed. Yungas, 1890 (446).

Miconia rufescens, D. C. Prod. iii. 180, *fide* Cogniaux. Yungas, 1890 (447).

Miconia sessilifolia, Naud. Ann. Sci. Nat. Ser. 3, xiv. 181. Yungas, 1890 (526). = Rusby 2270.

Miconia ternatifolia, Tri., Trans. Linn. Soc. xxviii. 118, *fide* Cogniaux. Yungas, 1890 (599).

MICONIA BOLIVIENSIS, Cogn., var. (?) GLABRA, Cogn., var. nov. Tota glaberrima. Folia membranacea. Alabastrum globulosum, vix. 1 mm. crassum. Flores perfecti ignoti. An spec. distinct? Yungas, 1890 (578).

MICONIA BANGII, Cogn. sp. nov. (Sect. Amblyarrhena). Ramis robustiusculis, junioribus leviter furfuraceo-puberulis demum glaberrimis; foliis rigidiusculis, elliptico-oblongis, breviter acuminatis, basi acutis, integerrimis, 5-plinerviis, supra glaberrimis, subtus vix furfuraceis; floribus 5-meris sessilibus vel subsessilibus, paniculatis congestis, non secundis; calyce breviter obtuseque 5-lobato, petalis obtusis. Rami obscure tetragoni et interdum leviter quadrisulcati, cinereo-fusci superne atro-purpurei. Petiolus robustiusculus atro-fuscus, leviter furfuraceus, 1.5–2 cm. longus. Folia supra viridi-florescentia et opaca, 2–2.5 dm. longa, 8–10 cm. lata, nervis subtus valde prominentibus, nervulis satis prominentibus valde tenuissimeque reticulato-ramulosis. Paniculæ late pyramidatæ, valde multifloræ, 12–14 cm. longæ, rami erecto-patuli, acute tetragoni, satis ramulosi. Calyx ovoido-campanulatus, 2.5 mm. longus latusque. Petala obovata, 2 mm. longa. Antheræ

oblongæ, 2 mm. longæ. Stylus satis gracilis, 4 mm. longus, stigmate subpeltato. Affinis *M. amblyandræ*, Naud. (Cogn. l. c. 874).

Songo, Nov. 1890 (828).

Miconia Bangii, var. (?) Rami graciliores. Folia paulo minora, viridia, basi longiore attenuata. Flores paulo minores. Yungas, 1890 (319).

MICONIA HIRTA, Cogn. sp. nov. (sect. Amblyarrhena). Ramis obtuse tetragonis, junioribus dense furfuraceo-puberulis et setulis patulis papillosis longiusculis subsparse hirsutis; foliis late ovatis, breviter acuminatis, basi saepius distincte cordatis, integerrimis vel vix denticulatis, 9-nerviis, supra bullis conicis setuliferis creberrime fustulatis, subtus crebre foveolatis ad nervos nervulosque hirtellis cæteris glabratis; paniculis majusculis, diffusis; floribus 5-meris, sessilibus, glomerulatis; calyce brevissime 5-lobato, superne pauci-setuloso, cæteris glabrato. Rami robusti, elongati, paulo ramulosi. Petiolus robustus 4–5 cm. longus. Folia rigidiuscula, supra viridi-purpurascentia, subtus cinerea, 1–1.5 dm. longa, 9–12 cm. lata. Paniculæ terminales et axillares, paulo ramosæ, 1–2 dm. longæ, ramis gracilibus, patulis, elongatis, vix ramulosis, brevissime subsparseque hirtellis. Calyx campanulato-ovoideus, fusco-violaceus, 2.5 mm. longus, 2 mm. latus. Petala alba, obovata, 1.5 mm. longa. Antheræ late oblongæ, 1.5 mm. longæ. Stylus filiformis, subrectus, 4–6 mm. longus, stigmate punctiformi.—Species *M. acalephoides*, Naud. (Cogn. l. c. 893.) proxima. Yungas, 1890 (491).

MICONIA BIACUTA, Cogn. sp. nov. (sect. Cremanium); ramis acute tetragonis, junioribus petiolis paniculis calycibusque dense furfuraceis; foliis longiuscule petiolatis, crasse coriaceis, anguste lanceolatis, basi apiceque acutis, superne obscure denticulatis, cæteris integerrimis, margine leviter revolutis trinerviis, supra glabris, subtus pilis stellatis rufis arcte adpressis dense vestitis; paniculis majusculis, valde multifloris; floribus sessilibus, 5-meris; calyce ovoideo-campanulato; antheris biporosis.

Rami robusti, cinereo-fusci. Petiolus crassiusculus, 1–2 cm. longus. Folia supra intense viridi-olivacea, 1–1.5 dm. longa, 1.5–2.5 cm. lata, nervis supra profunde impressis, subtus valde promnientibus, nervulis rectis creberrimis. Paniculæ thyrsoideæ, congestifloræ, 13–14 cm. longæ, ramis erecto-patulis, obscuræ tetragonis. Calyx cinereo-fuscus, 3–3.5 mm. longus, apice 2.5 mm. latus. Petala quadrato–rotundata, apice leviter emarginata, 1.5 mm. longa. Antheræ quadrato-ovoideæ, 0.75 mm. longæ.

Stylus satis gracilis, apice leviter dilatatus et truncatus, 3 mm. longus. Affinis *M. neriifoliæ*, Triana. (Cogn. l. c. 907.)
Yungas, 1890 (701).

Miconia ———. Probably undescribed, but material insufficient for description. Yungas, 1890 (340).

Clidemia ciliata, D. Don, Mem. Wern. Soc. iv. 309, *fide* Cogniaux. Yungas, 1890 (448). Distributed as *Ossæa*.

Clidemia dependens (Pav.) D. Don, Mem. Wern. Soc. iv. 307. Songo, Nov. 1890 (860).

Clidemia Rusbyi, Britton, Bull. Torr. Bot. Club, xvii. 211. Songo, Nov. 1890 (859).

CLIDEMIA ACUTIFOLIA, Cogn. sp. nov. (sect. Sagræa); ramis teretibus, junioribus leviter furfuraceis, vetustioribus glaberrimis; foliis breviter petiolatis, membranaceis, oblongo-lanceolatis, longe acuteque acuminatus, basi rotundatis, margine vix denticulatis et longiuscule ciliatis, 5-nerviis, supra vix furfuraceo-puberulis et breviter pauci-setulosis, subtus vix granulato-furfuraceis, leviter disparibus; cymis minutis, paucifloris, divaricatus; calyce oblongo-campanulato, densiuscule furfuraceo demum glabro.
Rami graciles, cinerascentes, inferne longe denudati. Petiolus gracilis furfuraceo-puberulus, supra densiuscule barbatus, 1–3 cm. longus. Folia læte viridia, 7–12 cm. longa, 2–4 cm. lata. Cymæ 1–1.5 cm. longæ; pedicelli filiformes, glabrati, 3–5 mm. longi. Flores basi bracteis 2 minutissimis subulatis caducisque muniti. Calycis tubus cinereus, 3–3.5 mm. longus, apice 1–1.25 mm. latus; dentes exteriores patuli, triangulari-subulati, .66 mm. longi. Petala anguste ovata, 1 mm. longa. Antheræ lineares, arenatæ, 1.5 mm. longæ. Stylus filiformis, deflexus, apice truncatus, 4 mm. longus. Bacca elliptico-ovoidea, limbo calycis coronata, 2–2.5 mm. crassa. Songo, Nov. 1890 (851).

Blakea repens (R. & P.), D. Don. Mem. Wern. Soc. iv. 325. Yungas, 1890 (604).

LYTHRARIEÆ.

Adenaria floribunda, H. B. K. Nov. Gen. vi. 188. Yungas, 1890 (374).

Cuphea ianthina, Köhne. Vic. La Paz, 10,000 ft., 1890 (272).

Cuphea ———. Yungas, 1890 (677).
Material insufficient for determination.

ONAGRARIEÆ.

Epilobium andicolum, Haussk. Oest. Bot. Zeit. 1879. Vic. La Paz, 10,000 ft., 1889 (75).

Epilobium denticulatum, R. & P. Flor. Per. iii. 78. Vic. La Paz, 10,000 ft., 1889 (75 a).

Perhaps distributed as a part of 75. The petals of *E. andicolum* are a centimeter in length.

Jussiæa Peruviana, L. Sp. Pl. Ed. 2, 555. Yungas, 1890 (248).

Œnothera rosea, Ait. Hort. Kew. ii. 3. Capi, March, 1890 (779). = Rusby 1814.

Œnothera multicaulis, R. & P. Fl. Fer. iii. 80, t. 317. Songo, Nov., 1890 (914).=Mandon 632.

ŒNOTHERA ELONGATA, sp. n. Stems simple, elongated, purple, irregularly angled, like the leaves and calyx more or less pilose; leaves sessile, 4–7 cm. long, 5–10 mm. broad, lanceolate to narrower, apex acute, narrowed toward the base, distantly denticulate, the upper entire, somewhat thickish, the few principal veins prominent and parallel, pale, toward the apex purple-margined; flowers sessile; ovary densely pilose, barely a centimeter long, about twice as broad as the calyx-tube, which (exclusive of ovary) is nearly 5 cm. long; calyx-lobes strongly reflexed, 15 mm. long, purple, narrow, acute; petals purple (?), drying yellowish, nearly 2 cm. long, slightly obcordate; stamens barely equalling the petals; pod oblong-linear, slightly crowned, 2–2.5 cm. long, 6 mm. broad when fully mature, purplish, obtusely angled and striate, densely pilose.

Near *O. mollissima*. Vic. La Paz, 10,000 ft., 1889 (54).

Fuchsia serratifolia, R. & P. Fl. Per. iii. 86, t. 325, Fig. a. Yungas, 1890 (731) = Rusby 1801.

Fuchsia corymbiflora, R. & P. Fl. Per. iii. 87, t. 325, Fig. a. Yungas, 1890 (674).

Fuchsia dependens, Hook. Ic. Pl. t. 65. Yungas, 1890 (327).

Fuchsia Boliviensis, Britton, Bull. Torr. Bot. Club, xvii. 214. Yungas, 1890 (675). = Rusby 1813.

SAMYDACEÆ.

BANARA PYRAMIDATA, sp. n. Branchlets, under sides of leaves and inflorescence densely ferruginous-tomentulose, internodes scarcely one-fourth the length of the leaves; petioles distinct, broad, 2–5 mm. long; leaves 1–1.5 dm. long, 4–6 cm. wide, lance-oblong, short-acuminate and acute, the base inequilateral

and mostly rounded, coarsely and sharply serrate, thickish, strongly veined, the veins prominent below, above slightly ferruginous, the veins more so; panicle pyramidal, peduncled, 15–20 cm. long, 4–7 cm. broad, loosely flowered, the branches mostly ascending; flowers pedicelled, about 7 mm. broad when fully expanded, the perianth recurved; pistil sub-glabrous, 5 mm. long, the styles very stout; filaments filiform, two-thirds to three-fourths the length of the pistil, very slightly thickened upward, the anthers short-elliptical; mature fruit not seen, when partly mature depressed-globose, dark purple, glabrous, the style persistent and somewhat accrescent.

Yungas, 1890 (365).

Distributed as *Hasseltia*, to which its resemblance is certainly very close. Very near *B. Guianensis*, but sufficiently well distinguished by the narrowed base of the leaves, if there were nothing else.

CASEARIA BANGII, sp. n. Large shrub, the branchlets dark purple-brown, finely warty; above slightly angled, and, like the petioles, very slightly puberulent, the plant otherwise glabrous; petioles 3–5 mm. long, stout; leaves rigid, 8–12 cm. long, 3 or 4 cm. broad, oblong, the base slightly acuminate, the apex more so and acutish, finely and closely serrate, the teeth mostly with minute dark incurved cartilaginous points, pellucid-punctate, pale, slightly shining above, the midrib and principal veins prominent underneath, the former angled by the decurrent veins; umbels loose, apparently by the premature falling away of most of the flowers; pedicels erect, articulated near the base, about 3 mm. long; calyx-tube scarcely 1 mm. long, the lobes 3.5 mm. long, oblong, thickish, concave, minutely ciliolate; filaments thickish, nearly 2 mm. long, the anthers short, minutely pubescent; staminodia shorter than the filaments, tomentose; ovary glabrous, globose; style stout, lanceolate, 2 mm. long, strigose; stigma large, capitate.

Songo, Nov. 1890 (845).

LOASEÆ.

MENTZELIA FENDLERIANA, Urb. et. Gilg (nov. spec.) foliis omnibus manifeste (inferioribus et infimis usque ad 1.3 cm. longis) petiolatis, lanceolatis; floribus in cymas laxas dispositis; filamentis 70–80, inæqualibus, 10 exterioribus usque duplo ceteris longioribus ac multo latioribus; capsula obconica vel turbinata, inferne sensim in stipitem 3–4 mm. longum attenuata; seminibus 5–6-alatis, ala semine ipso quadruplo angustiora; cotyledonibus quadratis, subito in radiculam subsesquilongiorem contractis. Perennans. Caulis erectus, pilis inæquilongis verticillatim glochi-

diatis dense obtectus, superne ramosus. Folia laxa, lanceolata, regulariter dentata vel serrata, basi subcuneata, apice breviter acuminata, infima usque ad 6.2 cm. longa 3.5 cm. lata, sequentia sensim minora, supra pilis antrorsum spinuligeris dense obtecta, subtus pilis brevibus subæquilongis tenuissimis antrorsum spinuligeris vel verticillatim glochidiatis densissime vestita, scabra, canescentia. Calycis tubus obconicus vel turbinatus, inferne sensim attenuatus, 5 mm. longus, superne 3 mm. crassus, pilis longis tenuibus verticillatim glochidiatis densissime vestitus, aliis antrorsum spinuligeris rarius intermixtis; lobi ovato-lanceolati, 1.3–1.4 cm. longi, supra basin 3.5 mm. lati, longe acuminati. Petala 5 verisimiliter aurantiaca, apiculata, 2.1–2.2 cm. longa, 0.9–1 cm. lata. Stamina 10, longiora 1.8 cm. longa, 1.2 mm. lata, cetera filiformia 1–1.1 cm. longa, inter sese et cum petalis connata. Capsula 1–1.1 cm. longa, superne 4–5 mm. crassa. Semina irregulariter ovata, flavescentia, 3 mm. longa, 1.8 mm. lata, medio 0.9 mm. crassa, endospermium perpaucum vel subnullum; embryo rectus.

Habitat in Venezuela prope coloniam Tovar: Fendler n. 1876; in Bolivia: Bang n. 748 et 1082.

CAJOPHORA RUSBYANA, Urb. et Gilg (nov. spec.). caule rigido crasso erecto, foliis lanceolatis, pinnatisectis, pinnis nunquam usque ad nervum medium intrantibus, ovato-triangularibus, inter sese disjunctis, usque ad 7-jugis, profunde dentatis vel dentato-serratis, dentibus integris; floribus in apice caulis in monochasium 2–3-florum laxissimum dispositis, 5-meris; squamis dorso filis 3 squamam multo superantibus instructis. Caulis ut videtur simplex, 40 cm. et ultra longus, parce foliosus, pilis modice longis verticillatim glochidiatis aliisque longioribus sed inæquilongis antrorsum spinuligeris densissime vestitus, setis undique dense vel densissime intermixtis. Folia usque ad 14 cm. longa, 4.5 cm. lata, petiolo usque ad 4 cm. longo instructa, supra pilis subæquilongis antrorsum spinuligeris basi sæpius bulbiformi-incrassatis laxius obtectis, subtus pilis antrorsum spinuligeris aliisque verticillatim glochidiatis densissime vestita, setis utrinque præsertim ad margines hinc inde intermixtis. Pedunculi florigeri 0.8–1.5 cm. longi. Calycis tubus obconicus, 1 cm. longus, superne 5 mm. crassus, pilis parvis antrorsum spinuligeris dense obtectus setis longis acutissimis vel urentibus horridus lobi lanceolati acuti, 2–2.2 cm. longi, supra basin 5 mm. lati, subintegri, sed parce ac obsolete denticulati. Petala bene evoluta 4–4.5 cm. longa, 1.8–1.9 cm. lata, 1.3–1.4 cm. profunda, profunde cymbiformia. Squamæ 6 mm. longæ, æque latæ et profundæ. Staminodia 2 interiora squamam multo superantia 1.5–1.6 cm. longa, sigmoideo-curvata, supra

basin dorso appendice densissime pilosa instructa. Stamina 100, bene evoluta 2.5 cm. longa. Ovarium inferum, placentis 3 late bifurcatis instructum.

Habitat in Bolivia, prope Cochabamba (1142).

CAJOPHORA HORRIDA, Urb. et Gilg, caulibus stricte erectis rigidis crassis; foliis ovatis usque late ovatis pinnatis, pinnis lanceolatis vel oblongo-lanceolatis, acutis, usque 10-jugis, profunde dentatis, dentibus angustis subrecurvatis semper acutis integris, supra setis dense vestitis vel potius horridis; floribus 7–6-meris in apice caulis solitariis, pedunculis usque ad 1 cm. longis, post anthesin usque ad 4 cm. acutis; squamis pilis dorsalibus squamam multo superantibus instructis, dorso carinis 3 paullo supra basin subito late prominentibus et usque ad partem $\frac{4}{5}$ squamæ alt. procurrentibus, apicem versus paullo sensim diminutis instructis, squamis ipsis margine superiore solemniter incrassatis; placentis 4 dichotomis planis; capsula oblonga vel ovati-oblonga.

Loasa horrida, Britt., msc. in Enum. Pl. Rusby in Bull. Torr. Bot. Club, xvii. (1890) p. 281.—*Loasa heptamera*, Britt. in Enum. Pl. Rusby in Bull. Torr. Bot. Club, xvii. p. 281, non Wedd. Caules simplices vel parcissime ramosi usque ad 40 cm. alti, pilis modice longis verticillatim glochidiatis aliisque æquilongis antrorsum spinuligeris densissime vestiti, setis undique dense intermixtis. Folia petiolo usque ad 5 cm. longo instructa, usque ad 15 cm. longa, 5.5 cm. lata. Calycis tubus obconicus 0.8–0.9 cm. longus, superne 0.7–0.8 cm. crassus, setis longis urentibus horridus; lobi ovato-lanceolati acuti, 1.3–1.4 cm. longi, 0.4 cm. lati, distincte regulariter serrato-dentati. Petala 2.6–2.7 cm. longa, 1.2–1.4 cm. lata, 1 cm. profunda, profunde cymbiformi-cucullata. Squamæ 7 mm. longæ, 4 mm. latæ. Staminodia 2 interiora squama multo longiora, 1.3–1.4 cm. longa, supra basin appendice densissime papilloso-pilosa instructa. Stamina 140–160, bene evoluta 1.4–1.5 cm. longa. Capsula 2.5 cm. longa, 2 cm. crassa. Semina numerosissima in placentis multiseriata, minima, pulcherrime elevatim hexaëdrico-nervosa.

Habitat in Bolivia: Bridges; in provincia Larecaja, prope Sorata, Lacatia, Arrilaya, Chuchu in petrosis, alt. 3800–4200 m. regione alpina; Mandon n. 619 (p. p. in herb. Paris cum *Cajophora sphærocarpa*, Urb. et Gilg mixta); vicinis La Paz (alt. 3300 m.) M. Bang n. 171. Floret in Mart.

CAJOPHORA BURÆAVI, Urb et Gilg. (nov. spec) caule volubili; foliis ovatis usque late ovatis profunde serrato-dentatis, serris ovatis vel ovato-oblongis, iterum aequaliter distincte serrato-dentatis, rarius basi pinnatifido-incisis, pinnis oblongis usque oblongo-ovalibus; floribus 5-meris; petalis 2.2–2.3 cm. longis; squamis dorso carinulis 3 parallelis paullo vel vix prominentibus sub apice inter sese conjunctis et hoc loco acutangule sursum curvatis notatis, filis dorsalibus nullis, antice subrotundatis obsolete trilobatis, lobis rotundatis densissimeque papillosis.

Blumenbachia lateritia, Britton in Enum. pl. Rusby in Bull. Torr. Bot. Club, xvii. 281 (non Klotzch).

Caules tenues teretes laxe foliosi, pilis verticillatim glochidiatis densissime obtecta aliis antrorsum spinuligeris retroflexis dense intermixtis, setis superne non raro obviis. Folio petiolo 1–3 cm. longo, lamina 3–5-plo breviore instructa, usque ad 11 cm. longa, 6 cm. lata, supra pilis antrorsum spinuligeris modice longus dense obtecta, setis dense intermixtis, subtus pilis antrorsum spinuligeris densissime vestita vel subtomentosa, aliis verticillatim glochidiatis rarius intermixtis. setis rarissimis. Flores in apice caulis in monochasia 1–3-flora, laxissima dispositi, penduli; pedicelli usque ad 9 cm. longi. Petala sub anthesi erectiuscula, obovato-oblonga. Staminodia 2 interiora squamam multo superantia 1.7–1.8 cm. longa, paullo supra basin rectangulari-incurvata atque hoc loco dorso appendice 2–3 mm. longa instructa. Stamina 70–80. Capsula oblonga, usque ad 4 cm. longa, 1.3 cm. crassa, spiraliter dextrorsum vel sinistrorsum contorta.

Habitat in Andibus Boliviæ et Peruviæ. Vidimus e Bolivia in provincia Larecaja: Mandon n. 618; vic. Cochabamba: M. Bang n. 1156; e Peruvia in provincia Carabaya Weddell n. 4735; Pasco: Matthews; Cumalca: Strubel n. 35 a.

PASSIFLORACEÆ.

Passiflora coccinea, Aublet; Mast. in Gard. Chron. 1873, 605.

Yungas, 1890 (312).

Passiflora fætida L., var. *nigelliflora*, Mast. in Mart. Fl. Bras. xiii. part 1, 583. Yungas, 1890 (646).

TACSONIA BOLIVIANA, sp. n. Glabrous, stems cirrhose, slender, sharply ribbed, light colored, the younger quadrangular; petioles slender, 5 mm. long, like the principal veins and pe-

duncles, red; leaves 2–3 cm. broad and two-thirds as long, deeply 3-lobed, the lobes obsoletely serrate-dentate and with a light colored narrow margin, oblong or lance-oblong, the apex rounded, 2 cm. long, 10–15 mm. broad; tendrils simple; peduncles solitary, axillary, slender, 20–25 mm. long; involucral bracts foliaceous, distinct, elliptical oblong, entire, 1–5–nerved, 7 mm. long by 3 mm. wide; tube of perianth 10–nerved, cylindrical, 12–14 mm. long and (as pressed) about 5 mm. broad; calyx lobes (color?) about 1.1 cm. long by 5 mm. wide, oblong; petals (violet?) about 8 mm. long; crown very small, membranaceous, irregularly lobulated; gynœcium somewhat exserted, 2 cm. long, the ovary oblong.

Vic. Cochabamba, 1891 (880). Distributed as *Passiflora*.

CUCURBITACEÆ.

Melothria Hookeri, Cogn. in D. C. Monog. Phan. iii. 588. Yungas, 1890 (258). = Rusby 2065.

SICYOS TRIGEMINA, sp. n. Stems slender, yellowish, angled, pubescent with soft spreading hairs, the tendrils simple; leaves distant, the petioles 4–6 cm. long, sparsely hispidulous; blade membranaceous, triangular-ovate, 6–8 cm. long, 7–10 cm. broad, angulate or indistinctly 3-lobed, narrowly acuminate, acute, the angles acutish, cordate with sinus broad and rounded or slightly truncate, 3-nerved, the veins prominent, the principal ones successively dichotomous, underneath minutely hispid, above more sparingly so but the trichomes longer, the margin spinulose-dentate, the teeth whitish, short, stout and blunt; flowers monœcious, the staminate about 12, racemose in distant whorls of 3, on slender, densely pilose peduncles 10–15 cm. long; pedicels slender, at length 8 mm. long, persistent after the fall of the flowers, which are 7 mm. broad; pistillate flowers not seen, their peduncles 1 cm. long; fruits 3-capitate, ovoid to oblong-ovoid, compressed, slightly 2–3-angled, when young villous, bearing few yellowish prickles from slight tubercles, 4 mm. long by 2.5 mm. broad (mature?) yellowish with green, abruptly acuminate apex; seed (mature?) elliptical oblong, 1.7 mm. long by 1 mm. broad.

Vic. Cochabama, 1891 (991). Distributed as *Melothria*.

Gurania lanata, Cogn. Diagn. Cucurb., fasc. 1, 26, fasc. 2, t. 1, fig. 2. Yungas, 1890 (628).

GURANIA BOLIVIANA, sp. n. Large and stout, more or less ferruginous tomentose throughout, the stem, petioles, peduncles and tendrils many-angled; petiole (but one seen) 1 dm. long; leaf sub-rotund, 2 dm. long and slightly broader, angulately 3-lobed for one-fourth to one-third of the distance to the base,

the lobes broadly triangular-ovate, short, acuminate and acute, the sinuses more or less rectangular, the basal lobes nearly semicircular, the basal sinus somewhat quadrangular, intruded upon by the short triangular base; margin finely spinulose-dentate, underneath densely short-tomentose, above similar but scabrous, the veins very numerous and prominent below, reticulate, the 3 primary about equal, stout, sulcate, the lateral forming the basal leaf-margin for about 1 cm., then bifurcated; tendrils stout, simple; peduncles considerably exceeding the leaves, the flowers about 15, umbellate, the pedicels about 1 cm. long and half as broad as the flowers which, when fully mature, are 20–25 mm. long; lobes about equalling the tube, which is lanceolate-cylindrical, 5 mm. broad, the teeth narrowly subulate, acute; petals triangular, 2.5 mm. long, their base about coincident with the base of the anther-appendage; anther replicate below, narrowly triangular-lanceolate, 1 cm. long by 2 mm. broad, the connective narrow, its appendage 1.5 mm. long, triangular, its outline regularly continuous with that of the anther, acute, yellowish, papillose, the remainder of the anther glabrous. Other parts not seen.

Yungas, 1890 (400). Perhaps the same as Rusby's 2062, which has the leaves less rigid, the lobes more angular, nerves less prominent, peduncles much shorter than the leaves, and appendage of anther black, linear and very abrupt. Distributed as *Anguria*.

CAYAPONIA BOLIVIENSIS, Cogn. sp. nov. (sect. Trianosperma?).

Monoica, tota glaberrima; foliis trifoliolatis; foliolis petiolulatis, rigidis coriaceisque, supra scabriusculis, subtus lævibus, margine minutissime remoteque denticulatis, apice acutiusculis, subæqualibus, mediano anguste obovato basi acuto lateralibus oblique ovato-oblongis, basi intus acutis extrinscens rotundatis; cirrhis bifidis; calycis tubo late campanulato, dentibus erectis, basi remotis, late triangularibus, acuminatis, tubo triplo brevioribus; staminum filamentis quam antheræ parvæ duplo longioribus.

Rami robustiusculi profunde sulcati læves. Petiolus robustus, sulcatus, lævis leviter tortuosus, 2–4 cm. longus; petioluli 7–10 mm. longi. Foliola siccitate pallide viridia, 10–17 cm. longa, 5–8 cm. lata, nervis nervulisque robustis, subtus valde prominentibus, valde ramuloso-reticulatis. Cirrhi validi, profunde sulcati. Flores in racemos elongatos multiflores interdum androginos digesti; pedunculus communis axillaris vel terminalis, robustus, sulcatus, simplex vel inferne brevissime ramosus, 2–3.5 dm. longus; pedicelli sæpius dense fasciculati, 1–4 mm. longi. Flores masculi parvi. Calycis tubus basi obtusus, 7–8 mm. longus, apice fere totidem latus; dentes 2.5 mm. longi et lati. Staminum filamenta

capillaria, basi vix dilatata et pilosula, 6–7 mm. longa; antheræ in capitulum 3 mm. longum et crassum cohærentes. Flores feminei ignoti. Fructus fasciculatus, globosus, glaber, lævis, fuscescens, 1.5 cm. crassus. Semina ignota.

Songo, Nov. 1890 (911).

MICRAMPELA MACROCARPA (Britton) (*Echinocystis macrocarpus*, Britton, Bull. Torr. Bot. Club, xvii. 284). Yungas, 1890 (533 and 615a).= Rusby 2060.

Cyclanthera tomentosa, Cogn. Diagn. Cucurb. fasc. 2, 77. Yungas, 1890 (706). Determined by A. Cogniaux, who notes "forma a feuilles moins velues."

Cyclanthera pedata, (L.), Schrad. Ind. Sem. Hort. Gott. 1831. Yungas, 1890. Cult. (381).

BEGONIACEÆ.

Begonia fagopyroides, Kunth et Bouche, Ind. Hort. Berl. 1848. Yungas, 1890 (333).

Begonia parviflora, Pœpp. & Endl. Nov. Gen. i. 7. Yungas, 1890 (334).

Begonia ——— sp. Near *B. ulmifolia*, but very distinct. Yungas, 1890 (406).

CACTEÆ.

* *Cereus*, sp. Vic. La Paz, 10,000 ft., 1890 (175).

Cereus, sp. Vic. La Paz, 10,000 ft., 1890 (176).

Cereus, sp. Vic. La Paz, 10,000 ft., 1890 (177).

HARIOTA BOLIVIANA, Britton, sp. n. Stems somewhat quadrangular and narrowly winged at the base, setose, the setæ 5–10, yellowish-white, about 2 mm. long; branchlets 15–30 cm. long, foliaceous-dilated, 1–2 cm. broad, irregularly crenate, the lobes 15–30 mm. long, their basal portions narrowed; midrib striate and minutely papillose, the wings also finely papillose and reticulate; flowers solitary or rarely 2 or 3, sessile in the sinuses, about 15 mm. long, one-half to two-thirds as broad, yellow; berry nearly 1 cm. in diameter, globose, the truncate apex broad, at the base hairy-tufted.

Yungas, 1890 (601). = Rusby 2048.

Opuntia, species apparently undescribed, but without fruit. Vic. La Paz, 10,000 ft., 1889. (18).

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* These specimens of Cereus do not give enough information to warrant a determination.

UMBELLIFERÆ.

Hydrocotyle quinqueloba, R. & P. Fl. Per. iii. 25, t. 248, fig. b. Yungas, 1890 (697).

Hydrocotyle eccentrica, Britton, Bull. Torr. Bot. Club, xviii. 36. Yungas, 1890 (714). = Rusby 1761.

Bowlesia palmata, R. & P. Fl. Per. iii. t. 251, fig. b. Vic. La Paz, 10,000 ft., 1890 (196).

BOWLESIA MANDONI, sp. n. Stems 2–4 dm. long, very slender, 5-ribbed, above sparsely pubescent; stipules small, scarious, fimbriate; petioles 2–4 cm. long; leaves about 15 mm. long and somewhat broader, rotund to subreniform, cordate, 3-lobed or 5-lobed with the lateral lobes smaller; the lobes ovate with flowing outlines, the apices rounded, mucronate with rather strong dark points, above glabrous, underneath sparsely hairy, the hairs stellate-branched much above the base; peduncles several times surpassing the leaves, 3-flowered; fruits barely 2 mm. long, 1 mm. broad, ovoid, strongly ribbed, sparsely muricate.

Talca Chugiaguilla, Apr. 1890 (804). The same collected by Mandon, No. 578.

Eryngium elegans, C. & S. Linnæa, i. 348. Yungas, 1890 (398).

Apium leptophyllum, (Pers.) F. Mueller, in Benth. Fl. Austral. iii. 372. Vic. Cochabamba, 1891 (960).

Conium maculatum, L. Sp. Pl. 243. Vic. La Paz, 10,000 ft., 1890 (150).

Daucus montanus, Willd. in Schult. Syst. vi. 482. Yungas, 1890 (229).

ARALIACEÆ.

Sciadophyllum pentandrum (R. & P.) Poir. in Lam. Encycl. vi. 747. Yungas, 1890 (548).

Sciadophyllum conicum, Poir. in Lam. Encycl. vi. 746. Yungas, 1890 (548 a). Perphaps distributed as a part of 548, and to be distinguished by its narrow and smooth leaflets.

SCIADOPHYLLUM PATULUM, sp. n. Stem, common petiole and peduncle unknown; glabrous; leaflets in my specimen 7, the petiolules rather slender, sulcate, 2.5–6 cm. long, the outer the shorter; leaflets oblong-lanceolate, with rounded base and apex abruptly contracted into an acute, triangular-lanceolate point, the outer 1 dm. long by 3 cm. broad, the central more than 2 dm. long by nearly one-half as broad, margined by a slender yellowish line and slightly revolute, coriaceous, the

midrib elevated above and slightly channelled, the veins slightly prominent and more so below; racemes cylindrical, very loose, 6 dm. long, nearly 1 dm. wide, the rhachis and peduncles blackish and finely channelled, the latter slender, irregularly disposed, divaricate, about 2 cm. long, loosely 12–20-flowered; pedicels slender, spreading, 5–6 mm. long; calyx 2 mm. broad, 1 mm. high, slightly dentate; corolla not seen; filaments 1 mm. long, the anthers a little shorter; styles 5, in the flower erect and partly connate into a conical column which is about 1 mm. long; fruit (mature ?) 4 mm. long and broad, globose-ovoid, dark red, tipped by at least a portion of the strongly recurved styles.

Yungas, 1890 (548 b). Perhaps distributed as part of 548.

Oreopanax Rusbyi, Britton, Bull. Torr. Bot. Club, xviii. 38. Capi, March 1890 (781). = Rusby 2654. Mr. Bang reports the flowers as very fragrant.

OREOPANAX MEMBRANACEUS, sp. n. Branches gray, strongly striate; stipules filiform, nearly 3 cm. long and, like the petioles, peduncles, etc., lightly ferruginous-tomentose; petioles stoutish, much dilated and dark-colored at the base, finely channelled, at length 15 cm. long; leaves membranaceous but somewhat rigid, glabrous on both surfaces, 5–7-lobed, divided to within 1 cm. of the base, the ribs and veins very strong and prominent on the lower side, impressed above, those of the two lateral divisions bearing a strong, nearly basal branch on the lower side; the divisions lanceolate or lance-oblong, both ends tapering, the upper into an elongated, very slender and acute acumination, the margin finely and sharply appressed-serrate, the lateral 10–13 cm. long, 3 cm. broad, the central 2 dm. long by 3 cm. broad; flowers capitate, about 10 together, the heads panicled; panicle lax, terminal, sessile, 3 dm. long by 2 dm. broad, the branches distant, the lower slightly drooping; peduncles 1 cm. long; petals oblong-lanceolate, acutish, 2 mm. long; filaments 2.5 mm. long, anthers ovate-oblong, less than 1 mm. long; styles united into a conical column; fruit not seen.

Yungas, 1890 (716).

CAPRIFOLIACEÆ.

Viburnum lasiophyllum, Benth. Plant. Hartweg. 189. Yungas, 1890 (371). = Rusby 726.

Viburnum glabratum, H. B. K. Nov. Gen. iii. 429. Yungas, 1890 (370). = Rusby 2584.

RUBIACEÆ.

Cinchona, sp. Yungas, 1890 (510). = Rusby 2347, but is not *C. condaminea*.

Lygistum (Manettia) Bangii, sp. n. Branches angular, the younger portions puberulent; stipules broadly ovate, barely acute, 3 mm. long, adnate to the petiole; petioles stout, about 5 mm. long, somewhat membranaceous-dilated; leaves ovate, the base rounded, apex slightly acuminate but barely acute, 4–8 cm. long, 2–3 cm. broad, the margin entire and revolute, coriaceous, pale both sides, especially below, glabrous both sides, except a slight ferruginous pubescence along the midrib, the veins impressed above in old leaves, prominently elevated and reticulated below; flowers 6–10, in short, nearly sessile secund racemes, the peduncle, pedicels and calyx tomentose; pedicels 3–6 mm. long; calyx-tube campanulate-hemispherical, barely 2 mm. long, the 4 lobes slightly longer, elliptical-ovate; corolla sparsely hairy, dark crimson or purple, the tube nearly cylindrical, 6 mm. long by 2.5 mm. broad, the lobes 3 mm. long and broad, ovate, acute, thick, strongly pilose within; fruit not seen.

Yungas, 1890 (537).

Hillia Boliviana, Britton, sp. n. Branches dichotomous, terete or nearly so, ashy-brown, the younger portions blackish; stipules not seen; petioles broad and fleshy, 3–5 mm. long; leaves oval-obovate, abruptly acuminate, the base slightly narrowed, 6–9 cm. long, including the acumination which is triangular-lanceolate and about 1 cm. long, 3–4 cm. broad, margin entire, scarcely revolute, above glabrous and drying blackish, with the midrib prominent, below pale green and finely and densely rugose; principal bracts elliptical-oblong, 5–6 cm. long by 2 cm. broad, drying brown, thickish and rigid, many-nerved, densely minute-papillose both sides; calyx strongly nerved, the tube 3 mm. long and broad, the limb 3-lobed, lobes ovate, acute, 5 mm. long, 3 mm. broad; corolla tube slightly broader above, strongly and sharply nerved, 4.5 cm. long, 4–6 mm. broad, the lobes 12 mm. long, ovate; capsules somewhat compressed, slightly curved, stout, truncate at both ends, strongly 6-ribbed with weaker intermediate ribs, striate, 9 cm. long, 1 cm. broad; seeds brown, oblanceolate, nearly 3 mm. long, granulose-roughened, the coma loose, about 1 cm. long.

Yungas, 1890 (600). Distributed as "*Bignonia ??*".

Condaminea corymbosa (R. & P.) D. C. Prod. iv. 204. Yungas, 1890 (610). = Rusby 1898.

Malanea grandis, sp. n. Branches stout, quadrangular, glabrous; stipules not seen; petioles glabrous, stout, 1–5 cm. long;

leaves ovate to oval, acute, the base short-cuneate and tapering into the petiole, margin entire, not or very narrowly revolute, 15–30 cm. long, one-third as broad, coriaceous, pale, glabrous both sides, above slightly shining with the midrib broad and channelled, underneath prominently reticulate; bracts triangular-ovate, slenderly and sharply acuminate, 6 mm. long, 3 mm. broad; panicles 3 or 4, terminal or sub-terminal, tomentellate, the peduncles about 4 cm. long, stout, dark, the panicles about 8–10 cm. long, one-half to two-thirds as broad, lax and open; calyx 1.5 mm. long, enlarging somewhat after flowering, the triangular-subulate, acute, erect teeth a little shorter than the tube; corolla 3 mm. long, the tube short, the lobes oblong, erect, the essential organs much exserted.

Yungas, 1890 (418). Distributed as *Chimarrhis*.

Warszewiczia coccinea (D.C.) Klotsch, Mon. Ber. Akad. Wiss. Berl. 1853, 496. Yungas, 1890 (284). = Rusby 1954.

Coccocypselum canescens, Willd., ex Ch. & Sch. Linnæa, iv. 139. Yungas, 1890 (270). = Resembles Rusby 1896.

Hoffmannia brachycarpa, Britton, Bull. Torr. Bot. Club, xviii. 108. Yungas, 1890 (336). = Rusby 2522.

HOFFMANNIA PALLIDA, sp. n. Branches woody and terete, pubescent, the younger parts, petioles, stipules, pedicels, etc., ferruginous-tomentose; stipules triangular, scarcely 2 mm. long and broad, acute; leaves oblanceolate, tapering at both ends, very much so at the base into a slender petiole of the most variable length, those of the pair being very unequal, 3–8 cm. long by 1–2 cm. wide, entire, or toward the apex sparingly and minutely toothed, above sparsely and very minutely white-strigose, underneath very pale, similarly stigose and on the midrib and veins ferruginous-tomentulose; flowers few, the pedicels slender, the latter 5–10 mm. long; calyx tube of the open flower oblong, strongly angled, 2 mm. long by 1 mm. broad, the teeth triangular-sinuate; corolla 5 mm. long, slender and delicate, the lobes oblong, very obtuse, surpassing by 2 mm. the essential organs; fruit nearly globose, 4–5 mm. in diameter, pale brown.

Yungas, 1890 (354).

HOFFMANNIA PEARCEI, sp. n. Branches herbaceous, tetragonal, deeply sulcate, pubescent; stipules very small, broadly triangular; leaves oval-oblong, acuminate at both ends, the base tapering into a slender petiole 1–2 cm. in length, the blade 6 to 12 cm. in length and about half as broad, strigose and tomentose as in the last, the midrib broad and margined; peduncles crowded, pubescent, slender, 1–2 cm. long, 5–8-flowered, the

pedicels 3–5 mm. long; calyx tube in flower obscurely angled, oblong-globular, the mouth constricted, the teeth small, triangular; corolla nearly 5 mm. long, thickish, the lobes lance-oblong, acute; corolla in the bud narrowly lanceolate, acute; fruit depressed-globose, 4 mm. in diameter.

Yungas, 1890 (498). The same collected by Pearce at Muna, 126. Very near the last, but clearly distinguished by the branches, the larger and broader leaves, more numerous flowers, constricted calyx and thicker, acute corolla lobes.

CHOMELIA TENUIFLORA, Benth in Herb. Kew. Branches terete, light brown, above, like the peduncles, etc., pubescent, leafy; stipules not seen; petioles 5–10 mm. long; leaves oblong, equally acuminate at both ends, cuspidate, 4–7 cm. long, 15–25 mm. wide, entire, above glabrous, underneath slightly pubescent upon the midrib and very prominent, erect, primary veins, of which there are 5–7 on each side; spines opposite, arising a little above the axils, 10–15 mm. long, stout, pungent with yellow points; peduncles solitary in the axils, straight, ascending, 3–4 cm. long, ribbed; bracts subulate, erect, 3 mm. long; secondary peduncles 3–7 mm. long, bearing 4–7 nearly sessile flowers; calyx-tube ovoid cylindrical, 1 mm. long, the two shorter teeth 1 mm. the two longer 2 mm. long, thickish, rigid, narrow, acute; corolla pubescent, the tube exceeding 2 cm. in length, 1 mm. broad, cylindrical, the lobes lance-oblong, slightly acuminate, acute, 4.5 mm. long, 2 mm. broad, thickish; fruit not seen.

Yungas, 1890 (342). = Mathews, Peru, 1944. Collected also by Pearce at Santa Cruz.

Coussarea (?) Yungas, 1890 (366). = Rusby 2559 and Fendler's 1990 from Venezuela. It will probably be found necessary to found a new genus for this plant when fuller material comes to hand.

Faramea salicifolia, Presl. Symb. Bot. 24, t. 70. Yungas, 1890 (322). = Rusby 1870.

FARAMEA BANGII, sp. n. Glabrous, the branchlets quadrangular with rounded angles, deeply sulcate, like the petioles, peduncles and flowers, drying blackish; stipules ovate, acuminate, 1 cm. long, 6 mm. broad, thick, erect; petioles blackish, stout, 1 cm. long; leaves 1–2 dm. long, 25–50 cm. broad, oblanceolate, short-acuminate, cuneate, strongly coriaceous, shining, the margin revolute, sharply prominently veined underneath; panicle terminal, stoutly peduncled, loose, 1 dm. long, two-thirds

as broad; pedicels slender, 1 cm. long; calyx 3 mm. broad, conspicuously toothed, the teeth narrow, the sinuses broad; corolla-tube 5 mm. long, the lobes 8 mm. long by 3 mm. broad, lanceolate, partially erect, thickish; fruit not seen.

Yungas, 1890 (368). Distributed as *Coussarea*.

Psychotria tomentosa (Willd.) Muell. Arg.; Schum. Fl. Bras. vi. part 6, 370. Yungas, 1890 (535).

Psychotria Marcgraavii, Spreng. Syst. Cur. Post. 79. Yungas, 1890 (495). = Rusby 1893 and (?) 1866.

Psychotria Yungasensis, sp. n. (Eupsychotria) Stout, the branches terete, greenish, glabrous; stipules triangular-lanceolate to subulate, acute, 3 mm. long, one-half as broad; petioles 1–2 cm. long, broad, divaricate, rigid, glabrous; leaves ovate to obovate, short-acuminate, acute, the base cuneate in variable degree, 1–3 dm. long by .5 to 2 dm. wide, dull or obscurely shining above, much paler below, membranaceous but rigid, glabrous both sides, the yellow veins below fine but prominent; peduncles terminal or becoming lateral, stoutish, 4–8 cm. long; panicle corymbiform, in flower 6–8, in fruit 8–12 cm. long, the branches at about 40°, dichotomous, sparingly subulate-bracted at the base and upon a variable number of the branches, the latter flattened, channelled, and peculiarly pubescent along the upper side with stout, stiff hairs; flowers and fruits in the forks nearly or quite sessile, or adnate upon the branch at one side; buds regularly broadening to the truncate apex, where they are externally 5-saccate, pale; expanded flowers not seen; calyx constricted above the shining ovary, the limb broader, 2 mm. long with short triangular, pubescent teeth; corolla strongly pubescent, slightly constricted above the base, the tube 4.5 mm. long, bearing a circle of stiff hairs at the insertion of the stamens, the thickish lobes triangular-oblong, 2.5 mm. long, obtuse, each bearing a yellow protuberance at the tip, within; anthers clavate, black with white margins, 3 mm. long, one-sixth as broad at the rounded apex; ovary 2-celled, black, the style stout, white, the two spreading stigmas black; fruit depressed and compressed-globose, 2-lobed, 4–5 mm. broad, each half with 3 principal sharp nerves.

Yungas, 1890 (597 and 598).=Rusby 1865, determined as *P. cornigera*, Benth. (?) This name appears not to have been published, and as there is doubt as to the identity, it is deemed best to publish a new name. The species seems nearest to *P. pubigera*, Muell. Arg.

PSYCHOTRIA BANGII, sp. n. Branchlets terete, glabrous, red, leafy; stipules triangular-subulate, acuminate, 5 mm. long, 2 mm. broad at the base, delicate, brown with light tips; petioles 5–10 mm. long, brown, margined; leaves 1–2 dm. or more long by 4–10 cm. broad, oval, short-acuminate, acute, the base cuneate, glabrous, above slightly shining, reticulate, underneath the ribs sharply prominent, irregularly alternating with rather indistinct smaller ones; inflorescence terminal, becoming lateral, the peduncles solitary, stoutish, pubescent, about 6 cm. long; bracts of the lower branches brownish, delicate, linear-lanceolate, 6 mm. long, obsolete or nearly so elsewhere; panicle very loose. ovate-pyramidal, 6–8 cm. long, the base 4–5 cm. broad, pubescent; flowers few, glomerate-crowded, sessile; calyx 1.5 mm. broad, the teeth triangular, broader than long, about equalling the ovary; corolla orange-colored (?), pubescent inside, stiff-hairy at the insertion of the stamens, the tube 3–4 mm. long, expanded at the throat where it is 1.5 mm. broad, the lobes 1.5 mm. long, ovate, the apex rounded; anthers white, linear, 2 mm. long and one-fifth as broad; ovaries separate, brown and shining; fruit not seen.

Yungas, 1890 (404).

PSYCHOTRIA FALCATA, sp. n. Branchlets terete, glabrous, dark brown; stipules brown, triangular, inequilateral, obtuse, 3 mm. long by 2 mm. broad; petioles 1–2 cm. long, dark brown; leaves 1–2 dm. long by 5–8 cm. wide, ovate or the lower obovate, short-acuminate at both ends, obtusish, rigid, dark green, not shining, glabrous, except the midrib, which is puberulent on both sides; peduncles terminal, solitary or accompanied by two smaller ones, about 3 cm. long, dark brown, puberulent; bracts narrowly linear, the lower 1–2 cm. long, the upper small, setaceous; panicle lax, pyramidal, 10–12 cm. long, 8–10 cm. broad, the rhachis much swollen at the joints, the branches opposite, strongly falcate, abruptly depressed at first, then strongly upwardly curved; flowers pedicelled, the pedicels bearing two short, broad, thick branchlets; calyx barely 2 mm. broad, the teeth triangular, green, about equalling the ovary; corolla-tube 5 mm. long, the triangular ovate obtuse teeth 2 mm. long, two-thirds as broad; anthers 2 mm. long by one-fifth as broad; style crooked.

Yungas, 1890 (516). A species strikingly peculiar in the origin of the branches of the panicle and in its crooked style.

PSYCHOTRIA STIPULARIS, (Benth.) (*Palicourea stipularis*, Benth. Pl. Hartweg. 133). Yungas (536). = Hartweg, Peru, 749, *fide* Britton.

PSYCHOTRIA GUIANENSIS, (Aublet) (*Palicourea Guianense*, Aublet, Fl. Guian. t. 66) (?). Yungas, 1890 (579). Apparently the same as Aublet's figure, but lacks flowers.

PSYCHOTRIA (PALICOUREA) FLAVIFOLIA, sp. n. Glabrous, the branchlets stout, dark-brown, ribbed; stipules nearly 5 mm. long and broad, triangular, blunt, thickened, rigid; petioles short, consisting of the narrowed base of the leaf, which is 1–2 dm. long, scarcely one-third as broad, oblong, equally short-acuminate at both ends, coriaceous and rigid, shining on both sides, strongly yellowish in drying, much paler below, the midrib and veins prominent both sides, the former 3-sulcate above; peduncles stout, about 1 dm. long, the panicle about as long and one-half as broad, compound, rather dense, the branches ascending; basal bracts subulate, acute, rigid, recurved, 4 mm. long; pedicels manifest, stout; calyx 3 mm. broad, the lobes a little shorter than the broadly hemispherical tube, nearly semicircular; corolla externally puberulent, the tube 6 mm. long, slightly gibbous at the base and unequally dilated at the throat, the internal ring 2 mm. from the base, the lobes 3.5 mm. long, narrowly triangular-ovate, obtusish; anthers 2.5 mm. long by two-thirds as broad, oblong; fruit not seen.

Yungas, 1890 (346).

RUDGEA TOMENTOSA, sp. n. Branchlets stout, sub-glabrous, flattened and broadly channelled on the upper side; stipules blackish with whitish lacineæ, the blackish portion broader than long, at length 3-cleft, each lobe bearing about 3 narrowly subulate, rigid, pungent lacineæ which are longer than the lobe; petioles stout, 1–2 cm. long; leaves 1–2 dm. long, 6–10 cm. broad, ellipitical-ovate, very short-acuminate, obtusish, the base abruptly narrowed, very coriaceous, the margin strongly revolute, above dark and shining, with the midrib lightly sulcate and its branches impressed, underneath light gray-green, finely tomentose, the ribs strong and prominent, 11 to 13 pairs with smaller ones irregularly intervening, in direction somewhat irregular; peduncles strongly channelled, ferruginous-pubescent, 6–8 cm. long, about equalling the pyramidal, rather loose panicle, which is two-thirds as broad as long, its branches at about 45°, the branchlets 1–3-flowered, the bracts scarcely any; flowers sessile; calyx-tube (blackish) proper about 1 mm. long, the throat constricted, the limb connate about one-half its length, the teeth broadly triangular, obtuse, barely 0.5 mm. long, yellowish-ciliate; corolla-tube sparsely pubescent, 5 cm. long, the throat somewhat irregularly expanded, the lobes very nearly equal, lanceolate, obtusish; anther lanceolate, about 2 mm. long; fruit not seen.

Yungas, 1890 (367).

Nertera depressa, Gærtn.; Banks in Gært. Fruct. i. 124. Yungas, 1890 (700).

Diodia ———. Probably undescribed, but requires comparison. Vic. Cochabamba, 1890 (949).

Borreria capitata (R. & P.) D. C. Prod. iv. 545. Yungas, 1890 (397). = Rusby 1936.

Borreria ———. Too young for determination. Yungas, 1890 (376).

Borreria ———. In same state as last. Yungas, 1890 (473).

Borreria ———. Probably undescribed, but requires comparison. Vic. Cochabamba, 1891 (937). Distributed as *Diodia*.

Endlichera umbellata (Spreng) Schum.; Mart. Fl. Bras. vi. Part 6, 38. Vic. Cochabamba, 1891 (1000).

Richardia scabra, L. Sp. Pl. 330. Vic. Cochabamba, 1891 (885 and 944). = Rusby 1969.

Relbunium vaillantioides (C. & S.) Schum. in Mart. Fl. Bras. vi. Part 6, 115. Yungas, 1890 (269 and 518). = Rusby 1828.

Relbunium pusillum (Endl.) Schum. in Mart. Fl. Bras. vi. Part 6, 117. Vic. La Paz, 10,000 ft. (35). = Rusby 1842 (and 1837?).

RELBUNIUM COMPACTUM, sp. n. Glabrous, the roots perennial, densely tufted, reddish, slender, woody; stems densely tufted, slender, ascending, very leafy, 1–2 dm. long, the internodes one-half longer than the leaves, strongly sulcate, the angles rounded; leaves sessile, oblong to slightly lanceolate or slightly oblanceolate, 4–8 mm. long, 1–2.5 mm. broad, acute, the younger minutely pointed, strongly revolute, thick, rigid, dark green, the midrib very strong and prominent underneath, the veins obscure, the upper surface rough-wrinkled in drying; peduncles axillary, solitary, scarcely half the length of the leaves, mostly erect or ascending, stoutish, narrowly 4-winged, terminating in 4 leaf-like bracts about the solitary sessile fruit; flowers not seen; bracts unequal, one pair slightly longer, the other slightly shorter than the fruit, which is compressed, the broad outline sub-rotund, 2-lobed, not deeply sulcate, very minutely tuberculate-roughened, about 2 mm. broad.

Talca Chugiaguilla, April 1890 (801).

GALIUM PLUMOSUM, sp. n. Roots not seen, the stems slender, diffuse, light colored, sharply angled, shortly but strongly retrorse-hispid, the internodes 4–5 times the length of the leaves, the branches short; leaves sessile, 5–8 or 9 mm. long, 1–1.5 mm. wide, oblong to linear-oblong, acutish, obscurely 3-nerved, more or less revolute, hispid, ciliate; flowers few, the inflores-

cence very laxly cymose, leafy; mature bud broadly pear-shaped, 1.5 mm. long; flowers yellowish-white, about 3 mm. broad, on slender reflexed pedicels 2–3 mm. long; fruit blackish, small, densely white-hairy, the hairs long and straight. Vic. Cochabamba, 1891 (760).

VALERIANEÆ.

Valeriana Pavonii, Poepp., in Herb. Kew. *fide* Britton, Bull. Torr. Bot. Club, xviii. 263. Yungas, 1890 (298).=Rusby 2160.

Valeriana paniculata, R. & P. Fl. Per. i. 41, t. 70. Yungas, 1890 (154). Distributed as *Phyllactis*.=Rusby 870 and 883.

Valeriana scandens, L., Sp. Pl. Ed. 2, 47. Yungas, 1890 (594).

Valeriana Boliviana, Britton, Bull. Torr. Bot. Club, xviii. 263. Yungas, 1890 (326).=Rusby 871, 875, 877, 872 (1237 ?). To Dr. Britton's description I would add the following: Leaves above coarsely or bristly hairy upon and near the teeth; flowers solitary and sessile in the bracts; fruits 2.5 mm. long, strongly compressed, the broad outline ovate, sharply 5-ribbed, the calyx-limb broad, crown-shaped, sharply 10-ribbed, about as long as the pappus.

COMPOSITÆ.*

Vernonia laurifolia, D. C. Prod. v. 30 (?). Yungas, 1890 (617). = Rusby 1617 (?).

Vernonia scorpoides, Pers. Ench. ii. 404. Yungas, 1890 (222 and 405). = Rusby 1704.

VERNONIA PAUCIFOLIA, sp. n. Stems several from a stout woody crown (root not seen), the stems in my specimen about 4 dm. long, rather stout, strongly many striate, densely ferruginous-hirsute, bearing, a little below the middle, 4 or 5 leaves of very

*Great difficulty in the determination of Compositæ from Bolivia has been caused by Schultz-Bipontinus, who has published (*Bull. Soc. Bot. France*, xii.) a large number of names without descriptions, or anything which can assist us in deciding whether we have these species in hand, unless we have access to the types bearing Mandon's numbers. Even this is not sufficient in many cases, as Mandon's spceimens referring to the different numbers appear to be considerably mixed. Under these circumstances we are frequently obliged to choose between leaving the speci nen undetermined until comparison can be made abroad, and disregarding the published names altogether. The latter alternative is not desirable, as it relieves synonomy to adopt the published names whenever possible. In all cases where I am certain of the identity of my specimens with those of Mandon, I have used the name of Schultz-Bipontinus and appended a description for the benefit of those who may follow.

irregular size, the lowest about 4 cm. long by one-third as broad, the uppermost 10 cm. long by 6 cm. wide, sessile, oval-elliptical to obovate, some with an obscure blunt acumination, obsoletely crenate-dentate, thick, above harsh, lepidote and very sparsely hairy, the veins and margin hirsute, the veins prominent, the first pair long, making the leaf sub-3-nerved, below densely ferruginous-tomentose ; panicle exceeding a decimeter in breadth, scarcely so long, of few pedunculate, secund, sub-sericeous branches, subtended by small, linear-lanceolate bracts; heads loose, on short, stout peduncles, about 8 mm. long including the pappus; involucre at first turbinate, about 4 mm. broad, becoming campanulate to broadly hemispherical; scales few, 3 or 4 serialled, thick and rigid, ovate-lanceolate, tapering, acute, hirsute, brown, 4 mm. long by one-third as broad; akenes compressed, hairy, about 2 mm. long, the pappus coarse, 1-serialled.

Yungas, 1890 (247).

Elephantopus angustifolius, Sw. Prod. 115. Yungas, 1890 (344).= Rusby 1591.

Elephantopus spicatus, B. Juss. in Aubl. Pl. Guian. 808. Yungas, 1890 (357).=Rusby 1109.

Elephantopus tomentosus, L., Sp. Pl. 814. Yungas, 1890 (497).

Adenostemma viscosum, Forst. var. *Brasilianum*, Benth. Fl. Austr. iii. 463. Yungas, 1890 (294).

Ageratum conyzoides, L. Sp. Pl. 839. Yungas, 1890 (235 and 407).

Stevia compacta, Benth. Pl. Hartw. 191 (?) Vic. La Paz, 10,000 ft., 1889 (86). = Rusby 1613. This specimen does not agree at all with Bentham's description "pappo minuto coronoformi," for the pappus is long, setose and purple. But it agrees with specimens so labelled in Herb. Columb. Coll., one of them "Matthews, Int. Peru," which is apparently that cited by Bentham in his description.

Stevia Boliviensis, Sch. Bip. Bull. Soc. Bot. France xii. 81, name only. Stem tall, stout, hollow, reddish, striate, below glabrous, hispidulous-pubescent upward, above bearing few, distant, slender, widely spreading branches in pairs; lower leaves early dying, the upper opposite, the petioles stout, about 1 cm. long, the blade 5–8 cm. long by 2–3 cm. broad, rhomboidal-ovate, obtuse, somewhat tapering at both ends, serrate-dentate, or crenate-dentate, rather thin, above dark green, below pale, drying yellowish or brownish, prominently veined, the lowest pair considerably stronger, above sparsely hispid-pubescent, underneath less harsh; heads glomerate-crowded at the ends of

the branches, sessile or nearly so; involucre cylindrical or the mouth slightly expanded, 6 mm. long; scales of the involucre proper 5, linear-oblong, acuminate, strongly curved, hispid, three-fourths the combined length of akene and corolla; flowers 5; akene (immature) 3 mm. long, slenderly oblanceolate, sharply angled, hispidulous; corolla nearly 4 mm. long, exclusive of the spreading lobes, which are 1 mm. long and ovate-acuminate; pappus deficient or nearly so on one side, on the other side of two nearly equal slender awns.

Yungas, 1890 (260).

Mandon's 242, on which the species is founded, I have not seen; but with that specimen Dr. Britton has matched my 1614, and with the latter Mr. Bang's specimen agrees. It also agrees with a part of Mandon's 244, which is said to consist in part of *S. Boliviensis*. It is therefore reasonably certain that the determination is correct.

Stevia stenocephala Sz. Bip. Bull. Soc. Bot. France, xii. 81, name only. (?) Mr. Bang's specimens are poor and I am not positive that they agree with any portion of Mandon's 245, which Schultz-Bipontinus says is partly *S. stenocephala*. Even if they did, what portion of Mandon 245 is *S. stenocephala?* We have no description whatever! Vic. La Paz, 10,000 ft., 1890 (611).

Eupatorium longipetiolatum, Sch. Bip. Bull. Soc. Bot. France, xii. 81, name only. Fruticose, the stems terete, light brown, glabrous, much wrinkled; branches striate, spreading widely, their internodes 2–3 cm. long, the upper portions, petioles, leaves—both sides—peduncles, etc., ferruginous-tomentellate; petioles 1–2 cm. long, stoutish, divaricately spreading; leaves 5–8 cm. long, 2–4 cm. broad, deltoid-ovate, acuminate, the base varying from broadly cuneate to subtruncate, irregularly crenate, toward the apex nearly entire, thick; inflorescence corymbose-paniculate, 6–12 cm. broad, 4–7 cm. high, subternate by the greater elongation of the lowest pair of branches, very dense; heads distinctly peduncled, 6–7 mm. high; involucral scales few, very imperfectly imbricate, 2 mm. long, oblong-obovate, acute, puberulent; flowers, including the akene, 5–6 mm. long, the corolla broadly funnel-form with short broad lobes, slightly exceeding the rather sparse and coarse pappus; style branches nearly 5 mm. long, very much exserted; mature akene black, linear-oblanceolate, very strongly 5-angled, scabrous.

Songo, Nov. 1890 (867). = Mandon 257.

Eupatorium Guanaiense, Britton, Bull. Torr. Bot. Club, xviii. 333. Yungas, 1890 (417). = Rusby 1735.

Eupatorium Guadalupense, Spreng. Syst. Veg. iii. 414. Vic. La. Paz, 10,000 ft., 1890 (504). = Rusby 1603, not Rusby 1606 nor 1609.

Eupatorium Guadalupense ? Yungas, 1890 (254). Near *E. paniculatum* Schrad. Must be compared further.

EUPATORIUM (?) ELEUTHERANTHERUM, sp n. Shrubby, the branches opposite, erect, stout, reddish-brown or reddish-gray, striate. glandular-scurfy, naked below; petioles 3–6 mm. long, rather broad, scurfy; leaves 2–4 cm. long, 10–15 mm. broad, lanceolate to lance-ovate, long-tapering, the base cuneate to subrotund, thick, coarsely serrate-dentate, slightly revolute, a pair of prominent veins from near the base, reticulate, scabrous both sides; inflorescence densely scabrous, corymbose-paniculate, dense, 6–12 cm. broad; heads stoutly peduncled 8–9 mm. long exclusive of the peduncle; involucre campanulate, lax, the scales 8 in two series, sub-equal, green and scurfy, thickish, especially the outer, linear-oblong, obtuse, 5 mm. long, about 1 mm. broad; corolla dilated in its upper two-thirds, about 6 mm. long, the lobes barely 1 mm. long, broadly ovate, obtusish; anthers reaching nearly to the corolla lobes, nearly 2 mm. long, not at all coherent, the base truncate or very minutely produced.

Vic. La Paz, 10,000 ft., 1889 (27), 1890 (193). Peculiar in the genus for its heavy, rank odor and its distinct anthers. Distributed as *Stevia*.

Willoughbya officinalis (Mart.) Kuntze, Rev. Gen. Plant. 372. (*Mikania officinalis* Mart. Fl. Bras. vi. Part 2, 221, t. 62). Yungas, 1890 (252).

Willoughbya cordifolia (L.) Kuntze, Rev. Gen. Plant. 372. (*Mikania cordifolia* Willd. Sp. Pl. iii. 1743.) Yungas, 1890 (696).

WILLOUGHBYA BANGII, sp. n. Stems climbing, reddish, lightly many-sulcate, minutely pubescent; petioles 1–2 cm. long, pubescent; leaves 6–12 cm. long, 2–6 cm. broad, ovate or elliptical, short-acuminate, obtusish, the base rounded, sub-5-nerved, the outer pair of nerves incomplete, finely reticulate, the principal veins impressed above, prominent underneath, minutely strigose both sides; secondary panicles axillary, 10–15 cm. long, their peduncles nearly one-half as long as the subtending leaf; heads very loosely arranged in very slender racemes, on short peduncles, oblong with truncate base, 3 mm. long by 1 mm. broad, the scales brown, chartaceous, minutely papillose; flowers

scarcely half the length of the scales, the corolla short-campanulate, half as broad as long, slightly shorter than the stout pappus, the lobes oblong, elongated; akene obovoid.

Yungas, 1890 (639 a).=Matthew, Peru, 1737, and Lechler 2315, *fide* Britton.

Solidago polyglossa, D. C. Prod. v. 332. Yungas, 1890 (449).

Aster marginatns, var. *acaulis* (Wedd.), Sch. Bip. Bull. Soc. Bot. Fr. xii. 81. (*Aster acaulis* Wedd. Chlor. And. i. 189, t. 33, Fig. a). Songo, Nov. 1890 (916).=Rusby 1718.

Aster Vahlii (Gaud.), H. & A. Comp. Bot. Mag. ii. 49 (??). Vic. Cochabamba, 1891 (941).=Rusby 2720. I have named this specimen in accordance with Dr. Britton's determination of mine, but it will require farther study.

Erigeron Bonariense, L. Sp. Pl. Ed. 2, 1211. Yungas, 1890 (234). =Rusby 1664 and 1665.

Erigeron Canadense, L., Sp. Pl. 863 (?). Vic. La Paz, 10,000 ft., 1889 (124).=Rusby 1666. The several plants occurring in various parts of South America which have been referred to this species require study. This one appears nearly identical with specimens in the Columbia College Herbarium labelled *E. spiculosum*, H. & A. Distributed as *Conyza*.

Erigeron floribundum (H. B. K.), Sch. Bip. Bull. Soc. Bot. Fr. xii. 81. Vic. La Paz, 10,000 ft., 1890 (149).=Rusby 2713.

ERIGERON PAZENSIS, Sch. Bip. Bull. Soc. Bot. Fr. xii. 80. Name only. Stems fascicled, erect, 3–6 dm. high, light brown or purplish, striate, scabrous, branched above, the branches erect, somewhat flexuous; leaves numerous, strongly ascending, 3–6 cm. long, 1.5–3 mm. wide, linear, narrowed to the clasping base, strongly 1–nerved, grayish-green, scabrous; elongated erect branchlets bearing 1 to several linear-subulate bracts and terminating in solitary heads, which are about 1 cm. long and 15 mm. broad, the involucre broadly hemispherical, its scales loosely imbricate, about 7 mm. long, linear subulate, grayish pubescent; receptacle 6 mm. broad, nearly flat, papillose; akene 2.5 mm. long, oblong, compressed, the edges sub-alate, light grayish brown, hispid; pappus scant, serrulate, slightly exceeding the involucre.

Vic. La Paz, 10,000 ft., 1889 (14 and 67).=Rusby 1662 and 1663.

ERIGERON BRITTONIANUM, sp. n. Root stout, woody, vertical, the stems several, short, thick, woody, densely crowded, 3–5 cm. high; leaves rosulate, densely crowded, 6–12 mm. long, 1–2 mm.

broad, spatulate, densely silky canescent both sides, sub-petiolate by the narrowed base, which is broadly dilated, reddish-brown, sub-glabrous and cartilaginous at the point of insertion; heads terminal, solitary, nearly sessile, large, 1 cm. or more broad, their peduncles bearing 1 or 2 long, linear bracts; involucral scales rather numerous and crowded, 2-serialled, unequal, lance-linear, tapering, the apex recurved, thickish, the middle portions dark, outside canescent like the leaves; receptacle 3 mm. broad, deeply foveolate; rays 35–50, white or purplish, narrowly linear-spatulate, involute and stiff on drying, exceeding the scales; tubular corollas about 5 mm. long, equalling or lightly exceeding the pappus, greenish, the lobes dark purple; akene oblanceolate, nearly truncate, sparingly stiff-hairy; pappus white, flexuous, finely toothed.

Songo, Nov. 1890 (913).

CONYZA YUNGASENSIS, sp. n. Canescent, the stem stout, erect or the base slightly depressed, about a meter high, strongly and rather sharply angled; leaves sessile and sub-decurrent, the lowest 15 cm. long by 5 cm. broad, spatulate-oblanceolate, sub-petiolate by the long narrowed base, blunt, laciniately coarse-dentate, perhaps sometimes lobed, the teeth rounded, apiculate, some of them bearing 1 or 2 small teeth, pale below, where the midrib is strong and prominent, scabrous and hirsute both sides, upwardly becoming narrower and entire, the uppermost linear-subulate, tapering from the broad sessile base; panicles small, loose, rather few flowered; mature heads about 15 mm. broad, otherwise closely resembling those of *C. Chilensis;* receptacle 6 cm. broad: akene oblong-oblanceolate, abruptly narrowed at the insertion of the long, white pappus.

Yungas, 1890 (202). Very near *C. Chilensis*, Spreng., but differing in the much stouter and more leafy habit, smaller and more numerous heads, akene one-half longer, lighter, not truncate at the insertion of the pappus, which is longer, more copious and not cinnamon-colored.

Baccharis cassinoides, D. C. Prod. v. 412. Yungas, 1890 (286).
= Rusby 1570.

Baccharis heterothalmoides, Britton, Bull. Torr. Bot. Club, xix. 4.
Vic. La Paz, 10,000 ft. 1889 (105). = Rusby 1709.

Baccharis alpina, H. B. K. var. *serpyllifolia* (Decne.) Wedd. Chlor. And. i. 168 (?) Talca Chugiaguilla, April, 1890 (802).

In the paucity, length and narrowness of the involucral scales, the length of the pappus and the light color of the akene, this seems pretty clearly distinct from *B. alpina;* but until the male

plant is seen I cannot separate it from this polymorphous species.

Baccharis aphylla, var. *Boliviensis*. Sch. Bip. Bull. Soc. Bot. Fr. xii. 81. Yungas, 1890 (620). Staminate plant only. = Rusby 1567.

Baccharis trimera, D. C. Prod. v. 425. Yungas, 1890 (692). = Rusby 1564. We have in the herbarium excellent fruiting specimens of *B. genistilloides*, Pers., of the Wilkes' Exploring Expedition from Peru, exactly equalling Matthew's 193 from Peru; but they are very distinct from Mr. Bang's specimens, which are identical with Mandon's 203 and Rusby's 1564. It, therefore, seems to me that *B. trimera* is distinct from *B. genistilloides*, Pers.

BACCHARIS MICROPHYLLA, var. (?) PULVERULENTA, n. var. Pale yellowish, the branchlets and leaves rusty-scurfy, the latter strongly revolute and beset underneath with large black glands.

Vic. La Paz, 10,000 ft., 1889 (74).=Rusby 1566.

Baccharis trinervis (Lam.), Pers. Syn. ii. 423. Yungas, 1890 (512). Somewhat more rigid and coriaceous than Rusby's specimens.

Baccharis retusa, D. C. Prod. v. 412. Yungas, 1890 (394).= Rusby 1572.

Baccharis glutinosa, Pers. Syn. ii. 425. Vic. Cochabamba, 1891 (754).=Mandon 197.

Baccharis subalata, Wedd. Chlor. And. i. 174. Yungas, 1890 (690).=Mandon 202.

Baccharis hemiprionoides, Buck, Bull. Soc. Bot. Fr. xii. 81. Vic. La Paz, 10,000 ft., 1889 (101).=Mandon 186.

Heterothalmus Boliviensis, Wedd. Chlor. And. i. 179, t. 31, fig a. Vic. La Paz, 10,000 ft., 1889 (28).=Rusby 1698.

Pluchea odorata (L.) Cass. Dict. 423 (?). Songo, Nov. 1890 (866). Vic. La Paz, 10,000 ft., 1890 (178). Distributed as *Moquinia*.

Tessaria absinthioides, D. C. Prod. v. 457. Vic. Cochabamba, 1891 (753).

Pterocaulon virgatum (L.) D. C. Prod. v. 454. Yungas, 1890 (423).=Rusby 1611.

Achyrocline saturioides (Lam.) D. C. Prod. vi. 220. Vic. La Paz, 10,000 ft., 1890 (239).

ACHYROCLINE RAMOSSISSIMA (Sch. Bip.) Britton, Bull. Torr. Bot. Club, xix. 148. Name only. Stems more or less procumbent at the base, the leafy branches erect, slender, flexuous, 15–30 cm. long, branching, luteo-lanate; leaves narrowly linear to linear-lanceolate, 2–5 cm. long, closely sessile, above bright yellowish-green and pilose, underneath densely luteo-lanate; panicle broad and lax, the heads crowded at the ends of the branchlets into compound glomerules which are about 1 cm. in breadth; heads about 4 mm. long, lanceolate in the bud, narrowly campanulate when expanded; scales ovate, acuminate, green at the base, closely imbricated; flowers about 5, the pappus and corolla about equalling the involucre; akenes 0.6 mm. long, oblong with sharply contracted apex, light brown, glabrous.

Vic. Cochabamba, 1891 (99).

ACHYROCLINE VENOSA, sp. n. Suffruticose, sparingly branched from near the base, the branches erect, strict, simple, 3–5 dm. long, leafy below, sparsely so above, terete, obscurely striate, finely lanate; leaves linear-oblong to lanceolate or oblanceolate, acute, tapering into a slender margined petiole which on the larger leaves is about 15 mm. long, dilated at the base, the blade proper 4–7 cm. long by 5–15 mm. broad, above dark and very finely and closely lanate, below flavescent and densely though finely lanate, the midrib very strong, strongly triple-nerved, the larger with an additional pair from near the middle, the secondary veins prominent; infloresence loosely paniculate, the branches from the upper axils, the heads closely glomerate at the ends of the branchlets, the ultimate glomerules about 7 mm. broad, yellowish-white, floccose at the base and among the heads, which are 4–5 mm. long, at first lanceolate and acutish, at length cylindrical or even slightly campanulate; scales 9, ovate, acute, strongly concave, very thin and transparent, 3 mm. long by a little more than 1 mm. broad; flowers 5, equalling or very nearly equalling the scales; akenes (not mature) very small, elliptical-obovoid; corolla narrowly funnel-form, yellowish; style-branches stout, about one-fourth the length of the corolla.

Vic. Cochabamba, 1891. Specimen unique, sent as part of 99. May be called 99 a. At first regarded as *Gnaphalium*.

Gnaphalium spicatum, Lam. Encycl. ii. 757. Vic. La Paz, 10,000 ft., 1889 (42). = Rusby 1594 and 1595.

Gnaphalium cheiranthifolium, Lam. Encyc. ii. 752. Vic. La Paz, 10,000 ft., 1890 (192). = Rusby 1593 and 1597.

GNAPHALIUM WEDDELLIANUM, Rusby (*G. capitatum* (Wedd.) Griseb.

Symb. Fl. Arg. 186, not of Thunb. nor Lam.) Capi, March, 1890 (776).

Gnaphalium, sp. probably undescribed, but requires farther comparison. Vic. La Paz, 10,000 ft., 1890 (261).

Elvira biflora (L.) D. C. Prod. v. 503. Yungas, 1890 (502). = Rusby 2351.

Clibadium asperum (Aubl.) D. C. Prod. v. 506. Yungas, 1890 (361).

Acanthospermum australe (L.) Kuntze, Rev. Gen. Plant. 303. Vic. Cochahamba, 1891 (884).

Acanthospermum xanthoides, D. C. Prod. v. 521. Yungas, 1890 (324).

Parthenium hysterophorus, L. Sp. Pl. 988. Vic. Cochabamba, 1891 (948).

Franseria artemesioides, Willd. Sp. Pl. iv. 374. Vic. La Paz, 10,000 ft., 1889 (63).

Xanthium spinosum, L. Sp. Pl. 987. Vic. La Paz, 10,000 ft., 1890 (143).

Zinnia pauciflora, L. Sp. Pl. Ed. 2, 1269. Vic. La Paz, 10,000 ft., 1890 (207).

Siegesbeckia orientalis, L. Sp. Pl. 900. Yungas, 1890 (466).

Jægeria hirta (Lag.) Less., Syn. Comp. 223. Yungas, 1890 (443). = Rusby 1618.

Wulffia baccata (L. f.) Kuntze, Rev. Gen. Plant. 373. Yungas, 1890 (489). = Rusby 1705 and 1706.

STEMODONTIA (WEDELIA) ELONGATA, sp. n. Stems slender, elongated, climbing, channelled, puberulent; petioles very slender, 1–2 cm. long; leaves 4–7 cm. long, 1.5–3 cm. broad, deltoid-ovate, acuminate, acute, the base abruptly slightly produced, sparingly serrate with slender acute teeth, membranaceous, slenderly 3-nerved, conspicuously but finely reticulate, minutely scabrous both sides; peduncles terminal, elongated, the head solitary; involucre hemispherical, 1 cm. broad, scabrous-pubescent; scales strongly 3-nerved, thick, the outer about 5 mm. long by 2 mm. broad, with foliaceous tips, the inner one-third shorter, wholly rigid, with rounded or apiculate apex; rays strongly nerved, more than 1 cm. long; disk convex to subconical, 8 mm. high including the receptacle. Material insufficient for dissection.

Yungas, 1890 (685).

Stemodontia (*Wedelia*) ———(?) Apparently of this genus, but more material is required. Songo, Nov. 1890 (896).

Eleutheranthera ruderalis, Sch. Bip., Bot. Zeit., 1866, 165. Vic. La Paz, 10,000 ft., 1890 (503).

OYEDÆA PEARCEI, sp. n. Stem stout, branching, leafy, scabrous and ferruginous, especially above, the branches strongly ascending; petiolies 5–10 mm. long, broad, the base dilated and clasping; leaves 5–10 cm. long by 1.5–3 cm. broad, lanceolate, acuminate at both ends, obsoletely sinuate-dentate, slightly revolute, thick and rigid, scabrous and strigose both sides, the veins impressed above, prominent and pilose underneath; heads 1 to several at the ends of the branches; involucre hemispherical, 7 mm. broad, 5 mm. high, the scales about 3-serialled, hairy, thick and rigid with recurved foliaceous tips, ovate, strongly concave with the margins spreading, about 5 mm. long by 2 or 2.5 mm. broad; rays about 10, oblong, nearly 15 mm. long, thick, pubescent outside, the 3–5 principal nerves keeled exteriorily, their akenes nearly 2 mm. long, obovoid-triangular and slightly winged, from each angle a serrulate seta nearly as long as the akene; disk-corollas about 5 mm. long, the limb very short, their akenes similar to those of the rays but 2-winged, with 2 principal setæ and two or three smaller ones intervening.

Yungas, 1890 (546). Collected also by Pearce at Santa Cruz, *fide* Britton. Distributed as *Zexmenia*.

VIGUIERA PAZENSIS, sp. n. Stems stout, erect, much branched, angled, scabrous, the short stout hairs from white blister-like elevations, divaricately spreading, the branches strongly ascending, rather sparsely leafy; leaves sessile, or the lower short-petiolate, 3–7 cm. long, 1 to nearly 3 cm. broad, lanceolate to ovate, short-cuspidate, the base subcuneate, the margin obscurely serrate and finely erose, upper surface dark green, underneath grayish-green with the slender veins prominent and pilose, both sides very scabrous, the upper more coarsely so; heads solitary on the long peduncles, some of which bear 1 or 2 small leaves; heads, exclusive of the rays, nearly 1.5 cm., exceptionally 2 cm., high and 2 cm. broad; base of the involucre concave, the lateral outline of the fruiting head reniform; disk-corollas 5 mm. long, the tube abruptly much dilated at the base, the dilated portion sub-globular, the lobes bright yellow, scarcely 1 mm. long, flaccid and spreading or recurved; anthers black, 2.5 mm. long; style-branches long, very strongly recurved; akenes pubescent, black, obscurely striate, triangular-oblanceolate, 4 mm. long, the apex truncate and nearly 1.5 mm. broad, the 2 setae very slightly shorter than

the akene, subulate, serrulate, several smaller ones between; the enveloping scales pubescent, 7 mm. long.

Vic. La Paz, 10,000 ft., 1889 (44). = Rusby 1683, 1684 and 2714. This species, though closely related to the next, is well distinguished by its smaller leaves, sessile with different pubescence and apex, broader heads, doubly more numerous and smaller disk flowers, the form and size of corolla tube and especially in the relative length of akene, disk scale and setæ, and the style-branches not twisted.

VIGUIERA MANDONI, Sch. Bip. Bull. Soc. Bot. Fr. xii. 79. Name only. Leaves more or less petioled, 5–15 cm. long, 2–5 cm. broad, above strigose and scabrous, below tomentose, ovate, the apex gradually, the base abruptly acuminate, entire or very obscurely serrate, the margin minutely revolute, thickish, 3-ribbed, the ribs connected by the secondary veins; peduncles stout, monocephalous; heads, exclusive of the rays, 2 cm. broad and about as high, the base little if at all concave, the lateral outline of the fruiting head nearly circular; involucre about 1 cm. high, gray-hairy, the scales lanceolate, long-acuminate, prominently 1-or 3-nerved; rays 2 or 3 times the length of the involucre; disk-corollas 6 mm. long, the tube cylindrical, very slightly dilated below, the lobes pale, erect, rigid; anthers black, 3 mm. long; style branches strongly spirally twisted; akenes 3 mm. long, triangular-obovate, the blackish apex truncate, 1.5 mm. broad, below light brown, strongly ribbed, pubescent, the setæ aristate, fully as long as the akene, purple, serrate, the enveloping scale 8 mm. long.

Vic. La Paz, 10,000 ft., 1890 (382).=Mandon 35, not Rusby 1683 nor 1684.

Verbesina ———. Vic. Cochabamba, 1891 (974). Possibly the same as Rusby 1721.

Verbesina ———. Vic. La Paz, 10,000 ft., 1889. (No. 4 in part, having the leaves small and not decurrent. May be regarded as No. 4.) Possibly this is *V. Mandoni* Sch. Bip.

Verbesina ———. Vic. La Paz, 10,000 ft., 1889. (No. 4 in part, having erect, elongated, decurrent leaves. May be called No. 4 a). I incline to the opinion that all these specimens are distinct from one another and from all collected by Mandon or myself; but, recognizing the wide limits of variation in this genus, I shall secure abundant material before determining.

Bidens andicola, H. B. K. Nov. Gen. iv. 237. Vic. La Paz, 10,000 ft., 1890 (16 and 141). = Rusby 1688.

GALINSOGA CALVA, sp. n. Annual, stems 5–30 cm. long, slender with long internodes, simple or branching from the base, the branches erect; leaves sessile or sub-petioled by the tapering bases, which are slightly connate, 15–30 mm. long, 2–8 mm. broad, lanceolate to oblanceolate, the upper linear and bract-like, tapering at both ends, sparingly and coarsely serrate, hirsute both sides, veiny below; heads few, solitary, peduncles axillary and in the forks, the heads 3 or 4 mm. high and broad; involucre hemispherical to campanulate, the scales, a few of the outer somewhat foliaceous though more or less rigid, the inner slightly longer and narrower, scarious; rays few, purple or purplish, the exserted portion 1.5 mm. long and broad, triangular-obovate, deeply and sub-equally 3-lobed, the included portion about 1 mm. long, their akenes broader than those of the disk, radially compressed, the pappus rudimentary and narrow; disk-corollas of the same color as the rays, strongly and coarsely pubescent, broadly funnel-form, scarcely 2 mm. long, one-half as broad, strongly 5-lobed, the lobes triangular-ovate, acutish, the pappus about extending to the base of the lobes, narrowly oblong, awned, fimbriate; akenes of the disk flowers black, 1.5 to nearly 2 mm. long, obovoid, angled, the angles hispid.

Talca Chugiaguilla, April, 1890 (809). Also collected subsequently in the vicinity of Cochabamba (1148). The nomenclature of this species is extremely complicated and puzzling. A specimen in Herb. Columb. of Mandon's No. 81, which is published by Schultz-Bipontinus in Bull. Soc. Bot. Fr. as *G. calva*, is a good specimen of *G. parviflora;* but Dr. Britton says that the specimen of this number in the Herb. Kew agrees with the one which I have above described. Dr. Britton says nothing about Mandon's No. 80 at Kew, referred to the same species by Sch. Bip., and of which there is no specimen in our herbarium. This difficulty effectually prevents my crediting the name to Schultz-Bipontinus, which I am not required to do, as his name is "nude." Mr. Baker (Fl. Bras., vi., Part 3, 167) increases the difficulty by referring this plant to *Jægeria hirta*, var. *glabra*. So far as this reference applies to Mr. Bang's specimens it is wrong, for they are certainly good *Galinsoga*. The subject is even farther complicated by the atonishing action of Dr. Watson in calling Pringle's No. 1282 *Jægeria calva*, Sch. Bip. Schultz never employed the combination thus quoted, and would unquestionably denounce such a combination as an error. Mr. Pringle's plant is a good *Jægeria*

and must probably stand as *J. calva*, Watson, being totally unlike the plant which I have in hand. While I am very desirous of retaining so many as possible of the names of Schultz, and giving him credit for the same, I feel that safety requires that this name henceforward be written *Galinsoga calva*, Rusby.

Calea robusta, Britton, Bull. Torr. Bot. Club, xix. 151. Yungas, 1890 (429).=Rusby 2137.

Schkuhria abrotanoides, Roth. Cat. i. 116. Vic. Cochabamba, 1891 (755).=Mandon 71, except that in that specimen all the 8 scales of the pappus are equally aristate, while in Mr. Bang's plant every alternate one is small and unappendaged. Distributed as *Pectis*, corrected by Mr. Canby.

Schkuhria pusilla, Wedd., var. *major*, Sch. Bip. Bull. Soc. Bot. Fr. xii. 88. Vic. Cochabamba, 1892 (966).

Flaveria Contrayerba, Pers. Syn. ii. 489. Vic. Cochabamba, 1891 (968).

Tagetes pusilla, H. B. K. Nov. Gen. iv. 194. Vic. La Paz, 10,000 ft., 1889 (53 in part. The involucre is only two-thirds as long as in *T. multiflora*, and is expanded above). Capi, March, 1890 (772). = Rusby 2133.

Tagetes multiflora, H. B. K. Nov. Gen. iv. 194. Vic. La Paz, 10,000 ft., 1889 (34 and 53 in part, the latter perhaps distributed as 53 and may be called 53 a). = Mandon 66.

Tagetes graveolens, L. Herit. in D. C. Prod. v. 644, ex descr. Vic. La Paz, 10,000 ft., 1889 (29).

PECTIS SESSILIFLORA, Sch. Bip. Bull. Soc. Bot. Fr. xii. 81. Name only. Stems numerous from a perennial base, prostrate or ascending, about 1 dm. long, stout, purple, angled, above very slightly puberulent, very leafy; leaves opposite, sessile, 15–20 mm. long, linear, the apex and margins long-aristate, thickish, revolute, above glabrous, underneath bearing 2 or 4 rows of very large dark-colored glands; heads mostly solitary, sessile at the ends of the leafy branches, about 1 cm. high and nearly as broad; involucre campanulate, of about 6 scales which are elliptical, thickish, about 8 mm. long, by 4 mm. broad, glandular like the leaves; receptacle globular, papillose; rays few, about equalling the pappus; akenes slender, obconical, black, pilose; pappus coarse, strongly serrate, longer than the slender, tubular, equally 5-lobed corolla, the setæ dilated at the base. Vic. Cochabamba, 1891 (746). = Mandon 238.

CEPHALOPHORA ROBUSTA, sp. n. A rank smelling perennial with stout widely branching root, the broad crown invested by the blackened leaf remains, the stems numerous, ramose, leafy, ascending, very angular, puberulent above; perfect radical leaves not seen, apparently very similar to the cauline, which are 3–6 cm. long, once pinnatifid into 5–7 linear, entire, obtuse or acutish divisions, the lower 10–25 mm. long, 2 mm. broad, somewhat fleshy, strongly nerved, minutely scabrous; peduncles erect, stout, monocephalous 3–5 cm. long, sharply ribbed; heads rayless, hemispherical, the larger 15 mm. broad, 10 mm. high; involucral scales 2-ranked, sub-equal, closely appressed, puberulent, broadly ovate or rhomboidal, about 6 mm. long by 4.5 mm. broad; receptacle conical, 4 mm. high, 3 mm. broad, pitted; akenes (in flower) triangular obconical, truncate, 3 mm. long, the apex 1 mm. broad, densely clothed with coarse silky hairs; pappus of 5 very thin, scarious scales, which are broadly ovate, 1.5 mm. long exclusive of the awn, the margin more or less erose or lacerate; corolla 3 mm. long, stout-cylindrical or above slightly dilated, pubescent.

Vic. Cochabamba, 1891 (925).

Chrysanthemum Parthenium (L.) Pers. Syn. ii. 462. Vic. La Paz, 10,000 ft., 1889 (20).

Anthemis Cotula, L. Sp. Pl. 894. Vic. La Paz, 10,000 ft., 1889 (128).

Plagiocheilus ——— species requiring further study. Vic. Cochabamba, 1892 (965).

Artemisia Absinthium, L. Sp. Pl. 848. Vic. La Paz, 10,000 ft., 1889 (131).

Liabum hastatum (Wedd.) Britton, Bull. Torr. Bot. Club, xix. 263. Yungas, 1890 (670).

Senecio vulgaris, L. Sp. Pl. 867. Vic. La Paz, 10,000 ft., 1889 (117).

SENECIO ATTENUATUS, Sch. Bip. Bull. Soc. Bot. Fr. xii. 80. Name only. Suffruticose, much branched from the base, branches erect, stout, flexuous, irregularly ridged, grayish-green, scurfy; petiole about 5 or even 10 mm. long, the leaves 15–40 mm. long, 7–20 mm. broad, oblong-lanceolate to ovate, obtuse or acutish, the base broadly cuneate, coarsely laciniately toothed or sub-lobed, revolute, thickish, below coarsely and sparsely hispid or hirsute, above puberulent; heads corymbosely crowded at the ends of the branches, bracted, short-peduncled, about 13 mm. high; involucre campanulate, 8–10 mm. wide, densely grayish pubescent, slightly exceeded by the disk-

flowers; rays about 8 or 10; akenes nearly 4 mm. long, oblong, truncate, angular, brown, canescent.

Vic. La Paz, 10,000 ft., 1889 (70); 1890 (180).=Rusby 1717.

Senecio clivicolus, Wedd. Chlor. And. i. 130. Vic. La Paz, 10,000 ft., 1890 (145).= Rusby 1670, etc.

Senecio floccosus, Britton, Bull. Torr. Bot. Club, xix. 264, where, by a typographical error, it appears as *floscosus*. Songo, Nov. 1890 (870).= Rusby 1680 and 1720.

SENECIO BANGII, sp. n. Shrubby and branching at the base, the stems several, slender, erect, 2–3 dm. long, the younger portions slightly floccose; leaves 2–3 times the length of the internodes, the petioles 15–20 mm. long, margined, the blade 3–5 cm. long, 15–25 mm. broad, oblong to ovate, obtuse, the base obtuse to truncate or somewhat cordate, irregularly sinuately dentate or lobed, above dark green, sparsely and finely lanate, below more densely lanate; peduncle terminal, about the length of an internode, the secondary of about the same length, erect, slender, 4–6 in number, bearing solitary heads and several filiform bracts above the middle; involucre broadly cylindrical or slightly campanulate, 1 cm. long and nearly as broad; scales 1-ranked, but slightly imbricated, linear, tapering and acute; rays about 15; disk-flowers and akenes very slender, the latter (in flower) linear, 4 mm. long, the corollas 6 mm. long; pappus very fine, minutely serrulate.

Capi, March, 1890 (778).

SENECIO CLAVIFOLIUS, sp. n. Shrubby, the stem low, horizontally branching, blackish, rough, the secondary branches erect, sparsely spiniferous, the branchlets interlocking, above green and fleshy, minutely and sparsely downy; leaves alternate, very fleshy, sub-clavate, upwardly curved, sessile, the apex furnished with a minute black mucronation, bearing 1 or 2 pairs of obscure teeth near the apex, 5–8 mm. long, 2 mm. broad, slightly lanate when young; heads mostly solitary, terminating the short branchlets; involucre 6 mm. high, 5 mm. broad, the outer scales several, very small, the principal ones imbricate and connate at the base, oblong, acuminate with black incurved tips which are continuous with the dark green middle portion, thick and somewhate rigid, about 10 in number; rays 7–10, 8 mm. long, the 3 lobes oblong, fully 1 mm. long; disk-corollas 8 mm. long, a little exceeding the pappus, which is rather coarse; mature akenes oblong, the apex truncate, nearly 2 mm. long and one-fourth as broad, light brown, strongly ribbed, hispid.

Talca Chugiaguilla, 1890 (792).

Senecio ———. Species apparently undescribed, but material insufficient. Vic. Cochabamba, 1891 (961).

Barnadesia polyacantha, Wedd. Chlor. And. i. 13. Vic. La Paz, 10,000 ft., 1890 (718).=Rusby 1552 and 1553.

Mutisia Orbignyana, Wedd. Chlor. And. i. 22. Vic. La Paz, 10,000 ft., 1889 (68), and Talca Chugiaguilla, April, 1890 (816). Also in Herb. Kew from La Paz by Pentland, *fide* Britton.

Mutisia viciæfolia, Cav. Ic. v. 62, t. 490 (?). Vic. La. Paz, 10,000 ft. 1889 (78).=Mandon 7, not Matthew, Peru, 457. It seems pretty clear that two species have been confused under this name. Mandon No. 7 is referred by Schultz-Bipontinus to this species, but does not agree with the figure given by Lamarck, Ill., t. 690, Fig. 2. This figure agrees with the specimen of Matthews above mentioned and that of Ensign Safford from Chicla. Without reference to the original figure and description, or knowledge of the type, I cannot decide which specimens are correctly named.

Mutisia hastata, Cav. Ic. v. 64, t. 494, ex descr. Vic. Cochabamba, 1891 (881).

MUTISIA COMPTONIÆFOLIA, sp. n. Shrub, the stem erect, much branched, the branches strongly ascending, densely leafy, glabrous; leaves 5–9 cm. long, 15–20 mm. broad, narrowly lanceolate, the apex tapering but obtusish, the base tapering into a short, margined petiole, deeply pinnately-lobed, the divisions oblong-lanceolate, obtusish, serrulate, thickish, glabrous both sides; heads terminating the short leafy branchlets; involucre lanceolate-cylindrical, 3–4 cm. long, 15 mm. broad, glutinous, lanate, ovate, the outer scales acuminate and acute, the inner rounded; flowers exserted to the extent of 15 mm.; rays few, narrow, scarlet.

Talca Chugiaguilla, April, 1890 (795).

Chuquiragua oppositifolia, Gill. et Don, Phil. Mag. 1832, 392. Vic. La Paz, 10,000 ft., 1889 (138).=Rusby 1555 and 1556.

Chuquiragua ferox (Wedd.) Britton, Bull. Torr. Bot. Club, xix. 266. Vic. La Paz, 10,000 ft., 1889 (96).=Rusby 1558.

——— ———. A plant apparently near *Mutisia*, but without more complete material even the genus cannot be certainly determined. Vic. La Paz, 10,000 ft., 1889 (66). Talca Chugiaguilla, April, 1890 (791).

Thyrsanthema nutans (L.) Kuntze, Rev. Gen. Plant. 369. (*Chaptalia nutans*, Hemsley). Yungas, 1890 (237).

Proustia pungens, Poepp. in Less. Syn. 110. Talca Chugiaguilla, April, 1890. Distributed as 797.

Perezia multiflora (H. & B.) Less., Linnæa, 1830, 15. Vic. La Paz., 10,000 ft., 1890 (736). Also from Vic Cochabamba, 1891, without number (736a).

Perezia cærulescens, Wedd. Chlor. And. i. 39. Songo, Nov. 1890 (915). = Mandon 20.

PEREZIA MANDONI, sp. n. Radical leaves erect or strongly ascending, 10–15 cm. long, including the petiole, scarcely 1 cm. broad, linear-oblanceolate, sharply pointed, gradually tapering into the slender petiole, which is more than half as long as the blade, distantly sinuate-dentate, the teeth cuspidate, the midrib prominent both sides, below broad and channelled, both sides glabrous; stems several, slender, scapose, monocephalous, 1–5 dm. long, many-bracted, the bracts 5–10 mm. long, subulate with clasping base, acuminate, spinulose-dentate; involucre campanulate, about 15 mm. high, 10 mm. broad, pappus one-fourth longer than the involucre, the scales lanceolate, acuminate and cuspidate, rigid, appressed, the outer successively shorter, the middle portion bright green, the broad margins white, scarious, the outer denticulate; receptacle slightly convex, foveolate; rays about 15, blue or bluish, oblong, the apex contracted, tridentate; disk-corollas 12 mm. long, shorter than the tawny pappus; appendages of the anther black, 2 mm. long, oblong obovoid, papillose.

Capi, March, 1890, and Vic. Cochabamba, 1891 (777). = Mandon 24, *fide* Britton. Very distinct from *P. pungens* (H & B.) Less., for which Mandon's specimens were distributed.

Jungia floribunda, Less. Linnæa, 1830, 38. Yungas, 1890 (673). = Rusby 1708.

HIERACIUM BANGII, sp. n. Roots fibrous, densely fasciculate, the stem erect, stout, 1 meter or more high, hollow, angled, below densely hirsute with retrorse hairs, above more sparingly hirsute, the hairs born on a spiculiform base; leaves 7–15 cm. long, 3–6 cm. broad, obovate or spatulate, the apex rounded but slightly mucronate, the base strongly clasping, thin and membranaceous, above sparsely strigose and minutely scabrous, underneath sparsely strigose, pale, with strong and coarse whitish midrib and veins; inflorescence loosely paniculate, the branches distant, elongated and weak, very sparingly bracted, the few heads irregularly crowded at the ends; involucre cam-

panulate, 5 mm. high, two-thirds as broad, with the border at length spreading, involucral scales linear-lanceolate, the outer shorter and broader, obtusish, thick, keeled, pubescent, the keel black-hispid; mature akenes 3 mm. long, sub-cylindrical, the base narrowed, the apex truncate, ribbed, reddish-purple; pappus tawny, flexuous, rather coarse and sparse, longer than the akene.

Yungas, 1890 (271).

Hypochæris elata (Wedd.) Griseb. Symb. Fl. Arg. 218. Vic. La Paz, 10,000 ft., 1890 (184). = Rusby 1723.

Hypochæris acaulis (Remy) Britton, Bull. Torr. Bot. Club, xix. 371. Vic. La Paz, 10,000 ft., 1890 (735). = Rusby 1716.

Sonchus asper (L.) Vill. Fl. Delph. iii. 158. Vic. La Paz, 10,000 ft., 1889, (59). 1890 (151 and 182).

Picrosia longifolia Don, Trans. Linn. Soc. xvi. 183. Vic. Cochabamba, 1891 (956).